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ABSTRACT

Part of a series on special education procedures in Florida, the manual presents a multidisciplinary perspective on matching the most effective communication device to the nonvocal/unintelligible learner. The approach reflects the thinking of parent educators, occupational therapists, speech therapists, and physical therapists. Information was gathered and analyzed on the evaluation of 24 students (3-15 years old) using the devices, and on seven communication systems (each of which is described in terms of step by step operation, size, portability, interfaces, accessories, ease of operation, cleaning, and durability). A variety of switch systems is also reviewed. Analysis of student use on each system is then presented, and minimum criteria (sensory, motor, language) for use are presented in the final section. (CL)

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A RESOURCE MANUAL FOR THE DEVELOPMENT AND EVALUATION OF SPECIAL PROGRAMS FOR EXCEPTIONAL STUDENTS

VOLUME III-E

Alternative Communication Systems For Non-Vocal Students

Bureau of Education for Exceptional Students

State of Florida
Department of Education
Tallahassee, Florida
Ralph D. Turlington, Commissioner
Affirmative action/equal opportunity employer

EC162410

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This Resource Manual was developed by the Orange County Public Schools through a special project funded by the Florida Department of Education, under federal assistance provided by the Education for All Handicapped Children Act (P.L. 94-142). It is one in a series of publications developed to assist Florida school districts in the provision of special programs for exceptional students.

For additional information on this or other publications, contact the Clearinghouse/Information Center, Bureau of Education for Exceptional Students, Division of Public Schools, Florida Department of Education, Tallahassee, Florida, 32301.

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PREFACE

This manual was developed by the Communication Systems Evaluation Center (CSEC) under a grant funded by Title VI-B, Special Needs Projects for Statewide Unmet Needs. The identified need was to provide evaluation services for students who exhibit nonvocal or unintelligible speech as a result of severe neuromuscular disorders. As a result of the services, a recommendation of a functional communication system is made.

The manual represents a compilation of data collected on students evaluated between July, 1980, and March, 1981. As an ongoing process, such data compilation is intended to identify the most effective means of "matching" the nonvocal/unintelligible learner to the most effective communication device.

The authors of the manual were members of the initial multidisciplinary team representing the following disciplines:

1. Parent education
2. Occupational therapy
3. Speech therapy
4. Physical therapy.

Each discipline has dealt with evaluation in terms of its own expertise. A melding of the various factors pertinent to an evaluation provides practical and useful information for:

1. Teachers as they integrate the student and his communication system into the academic program
2. Speech therapists as they implement language development through the use of the system
3. Occupational therapists as they deal with perceptual and fine motor aspects necessary to maximize the use of the system
4. Physical therapists as they correct positioning and interfacing to maximize the use of the system
5. Parents as the system is integrated into the family life style.

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INTRODUCTION

Review of the Literature

Children normally develop speech and language at an early age through informal and casual interactions. These skills enable them to communicate their needs, desires, thoughts and ideas and to interact in a variety of environmental contexts (Schiefelbusch & Hollis, 1980). Those who are communicatively impaired due to a severe neuromuscular disorder which precludes the development or recovery of functional speech require an active system with which to express themselves. The absence of communication is devastating to social, emotional, educational and vocational lives (Schiefelbusch, 1977).

The results of the research on the effectiveness of communication aids indicate that the devices promote self-esteem as well as self-expression and independence. This self-esteem manifests itself in greater participation in both social and academic interactions (Foulds, Crocheture, Baletsa & Myers, 1976).

Prior to the last ten years, few alternative systems to spoken language were available for students to enable them to express themselves and communicate within their environment. Simple language boards were early attempts to augment communication (McDonald & Shultz, 1973). While these continue to be useful with young children, a need for more efficient communication devices exists for students with a high level of receptive language. During the past five years, technological advances have encouraged the development of electronic communication systems which have wide-ranging potential for effective use.

Inherent in the use of any communication system is the decision on which device will best serve the user. Moores (1980) lists the following rationale upon which to make decisions regarding nonvocal communication systems.

1. An alternative system may be used as a part of a diagnostic procedure to determine patterns of functioning. The introduction of the system may be the first step in a clinical program that may later be generalized to other systems or to other environments.
2. A system may be the most effective means of provision of factual information, for concept development, and for the understanding of a relationship.
3. A system may provide the individual with a mechanism for expressing needs.
4. A system may provide a basis for the establishment of functional language processes.
5. A system may be used to develop, supplement, or strengthen oral language skills.

6. An alternative system may enable an individual who understands spoken language but who is not able to speak intelligibly to have a means of expressive communication.

7. An alternative system may provide some individuals with their only effective means of communication.

Nietupski and Hamre-Nietupski (1979) have advocated that an alternative system should be recommended for any child who has not produced intelligible utterances by age five to eight and who has not progressed adequately in a verbal communication training program. Simultaneous teaching of comprehension and production skills is also advocated since verbal communication is so important that it should not be replaced, but augmented whenever possible. However, if a child has a severe physical impairment such as cerebral palsy which hinders the development of adequate vocal speech, alternative communication skills should be introduced earlier than age five.

In addition, some authorities advocate that evaluation of a child's cognitive level, comprehension and use of language should be completed prior to the introduction of an alternative communication system (Chapman & Miller, 1977; Harris-Vanderheiden, 1975; Miller, 1977). They further state that there are cognitive prerequisites to the use of a communication system. Others (Guess, Sailer & Barr, 1977) have questioned the position of a cognitive-developmental prerequisite, have stated that a child's readiness for a communication program should be considered, and have advocated a remedial approach. The remedial approach includes efforts to teach functional language skills which are necessary for the students to communicate effectively in their environments. This approach indicates that the primary consideration should be to provide a functional means of communication now rather than delaying communication skill instruction until the presumed prerequisites have been acquired.

"Communication systems are display devices which have objects, pictures of objects or actions, symbols or printed words" (Harris-Vanderheiden, 1975, p. 11). The selection of the communication technique is a primary consideration in using these aids. There are three techniques:

1. Scanning generally refers to a technique where an indicator scans sequentially through a display of pictures, symbols or letters until stopped by the user with a switch. The aid then displays or prints the character, restarts the indicator and scans again until the next message is selected.

2. Encoding techniques involve the student's indication of the message element via a code of signals or patterns which are exhibited on a chart for both the message sender and the message receiver to use as a reference during conversation (Harris-Vanderheiden, 1975). Sequentially numbered pictures can be attached to the student's laptray. Those who can control their eye movements but not their hands and arms can be taught to designate the message elements by focusing on the numbers displayed in categories on a clear plastic eye-gaze chart (Nietupski & Hamre-Nietupski, 1979).

3. Direct selection techniques involve the student more directly in selecting messages. The direct selection varies in abstraction from pointing to actual objects, to pointing to symbols on a communication board, to making selection on an electronic communication device.

The selection of a symbol system to be used with the communication devices is another consideration. Depending upon the sophistication of the student's language, several symbol systems are available. They include the use of actual objects, pictures of objects and actions, printed letters, words, Blissymbols (Bliss, 1965), Rebuses and the Non-Speech Language Initiation Program (Non-SLIP) (Carrier & Peaks, 1975).

The selection of the appropriate alternative communication device is dependent upon the student's motor skills, sensory skills and language development. Many of the devices require eye, hand or arm movements while others can be activated by head wands, muscle contraction, or other controlled body parts. These choices are a distinct advantage for the use of communication devices by severely physically handicapped persons. Other advantages include the choice of a symbol system to match the student's language abilities, the permanent visual display and the opportunity for the student to both initiate messages and respond to them. The durability and portability of the device and the training required to use the device are also considerations (Nietupski & Hamre-Nietupski, 1979).

Making the decision of what system best matches a student's needs is a difficult task. It requires knowledge of the student's physical status, sensory status and language development. It also requires knowledge of the capabilities of devices. There are several centers which have been attempting to determine this "best match." One such program is the Non-Oral Communication Center at Plavan School in Fountain Valley, California. Another, Project TEACH, in Memphis, Tennessee, has supplied valuable information on new techniques for seating mobility and activities of daily living as well as communication devices.

There have been several studies relating specifically to the devices themselves (Vanderheiden & Grilley, 1977). One study provides a master chart of communication aids outlining the features of various communication devices. It does not, however, give information as to potential users. Another resource is "Communication Systems for Severely Handicapped Persons" (Fairweather, Haun, Finkle, 1980). This publication gives information on selecting a symbol system, types of devices and switches. The authors' conclusions are based on an eight student sample.

The Assistive Device Center in Sacramento, California, is testing various commercially available communication devices. Their procedure includes a technical evaluation as well as a human factors evaluation on a limited number of objects.

Many other authorities (Deich & Hodges, 1978; McDonald & Schultz, 1973; Hagen, Porter & Brink, 1978; Ratusnik & Ratusnik, 1974; Vanderheiden, 1976; Von Bruns-Connally & Shane, 1978; and Wenat, Sprague & Marquis,

1975) have investigated both the effectiveness and the necessity of communication systems for the severely physically handicapped student, the multiply handicapped student, the autistic student and the retarded student. They have concluded that without alternative communication systems, these individuals experience socialized handicaps such as lack of independence, occupation, social integration and others. These external manifestations are so profoundly handicapping that the proper evaluation of assisting devices for this population must be carried out to assure suitable matching of the device to the user, as well as safety and reliability of the device in daily use.

Description of Manual

The information in this manual was compiled between July, 1980, and March, 1981, on the evaluation of twenty-four students whose ages ranged from three years, four months, to fifteen years, four months. Seven communication systems were available for use in the evaluations.

The manual organization addresses the population served, the communication systems used, data compilation and the implications for minimum use of the systems based on the population evaluated.

The population is described by age, primary diagnosis and reading level (Table 1, p. 6) and by sensory, motor and language functioning level (Table 2, p. 12). Definitions used to determine functioning level are described on a scale of 0 - 4 by subcategories.

Each communication system is described by manufacturer, cost, physical characteristics, portability, interfaces, ability to adapt, accessories, display capabilities, output/feedback options, location of equipment, ease of operation, power source, service availability and general comments. Steps for operating the equipment are also included.

The section which addresses data compilation describes minimum sensory, motor or language competencies which a potential student user should possess to effectively operate the communication system. These include analysis of input made, key operation, and message delivery followed by general comments on each system.

The minimum criteria for use is presented in outline form addressing each main component: sensory, motor and language criteria through multiple subcomponents such as auditory acuity, range of motion and display language. This is followed by a minimum criteria user profile which charts each system on a scale of 0-4 to show characteristics of the handicapped which could effectively use the device in both communication and instruction.

The Appendices include a glossary of commonly used terms in the manual, a bibliography, and sample forms used in the data compilation.

POPULATION

The information for this study was compiled between July, 1980, and March, 1981. The population included twenty-four (24) students whose ages ranged from three years, four months, to fifteen years, four months. It also included data from a twenty-two year old who is employed by the center as an equipment user/demonstrator.

The subjects attend Forrest Park School which is a center for students who are physically impaired in Orlando, Florida. The primary diagnosis is cerebral palsy; however, two subjects are diagnosed as brain damaged secondary to anoxia from near drowning. The subjects selected demonstrated:

1. the ability to follow a one-step command,
2. a discrepancy between their receptive language ability and their expressive language ability, and
3. a wide variety of physical and communication abilities (see Table 1).

The subjects were seen for approximately half-hour sessions. The time of day varied since the students were evaluated at the convenience of the teachers. Students were evaluated while using selected communication systems and ranked in relation to predetermined criteria.

The evaluation results were recorded on a Student Input Evaluation Form (see Appendix A) which was devised by the CSEC staff. The front page included descriptive data of both student and equipment. On the second page the actual trial data was recorded including whether the student was able to do the task independently or needed individual attention, the command given, the response received and comments.

A program was written for each of the seven communication systems evaluated. The programs were designed to teach the students how to use the system, beginning with single responses and ending with spontaneous responses. The programs incorporated the use of all the features of a given system. When more than one interface was available, i.e. headstick and rocking lever, the evaluator chose the one considered to be the most appropriate for that student. In some instances, the student was evaluated with more than one interface.

TABLE I

	AGE		DIAGNOSIS	READING LEVEL
	yrs.	mos.		
1	3	10	cerebral palsy athetoid (quad)	pre-K
2	4	11	cerebral palsy spastic (para)	pre-K
3	5	4	cerebral palsy spastic (functional right hemi)	K
4	5	5	cerebral palsy spastic (quad)	K
5	5	7	cerebral palsy mixed spastic/athetoid (quad)	1.0
6	5	9	cerebral palsy mixed athetoid/ataxia (quad)	K
7	5	10	cerebral palsy ataxia (quad)	K
8	6	1	cerebral palsy spastic (quad)	pre-K
9	6	10	cerebral palsy spastic (quad)	K
10	7	3	brain damage secondary to drowning athetoid (quad)	K
11	7	9	cerebral palsy mixed athetoid/ataxia (quad)	1.7
12	8	0	cerebral palsy spastic (quad)	1.2
13	8	3	brain damage secondary to drowning athetoid (quad)	1.3
14	9	3	cerebral palsy mixed athetoid/ataxia (quad)	1.0
15	9	6	cerebral palsy spastic/athetoid (quad)	1.0
16	10	8	cerebral palsy spastic/athetoid (quad)	2.0
17	10	8	cerebral palsy spastic (quad)	9.0
18	11	2	cerebral palsy spastic (quad)	9.0
19	11	3	cerebral palsy tension athetoid (quad)	K
20	11	9	left hemi secondary to CVA	9.0
21	12	0	athetoid secondary to meningitis (quad)	9.0
22	12	9	cerebral palsy spastic/athetoid (quad)	2.8
23	12	10	cerebral palsy spastic left hemi	2.5
24	15	4	cerebral palsy spastic/athetoid (quad)	3.0
25	22	0	cerebral palsy athetoid (quad)	11.0

DEFINITIONS

In order to describe the sensory, motor and language characteristics of students evaluated, it was necessary to carefully define significant parameters in the three areas. By use of the definitions, evaluators could readily describe the characteristics of a student. This was generally true even if the characteristic was outside the evaluator's field of expertise. The definitions were developed for use at the Communication Systems Evaluation Center. Performance was evaluated on a scale of 0 - 4 with 0 being high.

Sensory

Visual:

Acuity -

0 - vision reported to be 20/20 uncorrected
1 - vision reported to be corrected to at least 20/30
2 - vision reported to be corrected to greater than 20/30 but less than 20/200
3 - vision 20/200 or worse

Attention -

0 - excellent - able to attend to visual stimuli without interruption with interfering environmental stimuli present
1 - good - able to attend to visual stimuli with occasional interruption with interfering environmental stimuli present
2 - fair - able to attend to visual stimuli with frequent interruption with interfering environmental stimuli; often needs reminding to stay on task
3 - poor - attends to visual stimuli only with frequent reminders to stay on task; often needs to be isolated from environmental stimuli

Tracking -

0 - able to follow moving object with head still in all planes (horizontal, vertical and diagonal); does not display jerk at midline
1 - moderate difficulty tracking in one plane; able to follow object with head still in at least two planes; usually difficulty is seen in diagonal plane
2 - moderate difficulty tracking in two planes; able to follow object in one plane (usually horizontal), but displays noticeable problems in the other two planes
3 - moderate difficulty in more than two planes; unable to track with head held in any plane; usually displays jerk at midline

Auditory:

Acuity -

0 - hearing reported to be adequate for conversational speech
1 - hearing reported to be corrected to within adequate limits for conversational speech
2 - hearing reported to be impaired to less than functional limits
3 - totally deaf - does not respond to conversational speech

Attention -

0 - excellent - able to attend to auditory stimuli without interruption with interfering environmental stimuli present
1 - good - able to attend to auditory stimuli with occasional interruption with interfering environmental stimuli present
2 - fair - able to attend to auditory stimuli with frequent interruption with interfering environmental stimuli present; often needs reminding to stay on task; often needs to be isolated from environmental stimuli

Discrimination -

0 - excellent - no difficulty with discreet auditory differences like voiced and voiceless phonemes
1 - good - isolated errors in similar phonemes
2 - fair - many errors in phoneme discrimination
3 - poor - cannot discriminate gross difference

Tactile Defensiveness -

0 - absent - does not withdraw from light touch; does not display discomfort from loose headbands or moderate restraining devices
1 - present - withdraws from light touch, rubs part of body touched, dislikes loose headbands or moderate restraining devices

Perceptual:

Motor Planning -

0 - good - displays ability to follow through on motor tasks efficiently, i.e. ability to perform a motor task quickly and correctly after seeing a demonstration of the task
1 - fair - displays ability to follow through on motor tasks with some hesitation

2 - poor - unable to complete motor tasks without thinking about how to do them, i.e. difficulty backing up to a chair to sit down or unable to put on shirt without following a learned set of directions
3 - physical disability prohibits evaluation of ability to motor plan

Figure Ground -

0 - able to distinguish objects from background at maturational age level
1 - unable to distinguish objects from background at maturational age level

Visual Discrimination -

0 - able to identify similar and dissimilar objects and shapes at maturational age level
1 - unable to identify similar and dissimilar objects and shapes at maturational age level

Motor

Degree of Involvement -

0 - normal - the student required no modification of equipment, special positioning strategies in classroom; walks safely, independently and without aid
1 - mild - the student required minor modification of equipment, minor positioning modifications in the classroom; an awkward, independent ambulator with or without aids
2 - moderate - the student would benefit from commercially available noncustom equipment modification, alternative positioning strategies for the classroom and usually is nonambulatory but able to propel a manual chair functionally around school
3 - severe - the student would benefit from customized equipment modification, several alternative positioning strategies for the classroom and is unable to propel a manual wheelchair for functional distances in the classroom

Reflexes that Interfere -

0 - normal - no evidence of persisting primitive reflexes; age appropriate equilibrium, righting and protective responses are present in all planes
1 - mild - evidence of partially integrated persisting primitive reflexes; equilibrium, righting and protective responses are present in at least three planes
2 - moderate - one or more unintegrated persisting primitive reflexes that interfere with but do not prevent fine motor activities; equilibrium, righting and protective

responses are slow and may be absent in two or more planes

3 - severe - student is dominated by persisting primitive reflexes that reduce or prevent self feeding, transfer or toileting skills; equilibrium, righting and protective responses are absent in three or more planes.

Muscle tone -

Tone refers to the tension normally felt in trunk and limb muscles, it is evaluated in the extremity used to access equipment or, if eyes or head are used, in the whole body.

0 - normal - there is no evidence of sustained involuntarily high or low tone, nor is there evidence of abnormal fluctuations from low to high or vice versa
1 - low - little evidence of sustained levels of tone in the extremity; eyes may have "droopy" lids and flesh feels soft and "mushy"
2 - fluctuating - limbs may show rapid, extreme changes of tone from high to low, with little control in the midrange of motion; student attempts to provide stability by using limbs in complete extension or flexion.
3 - high - limbs show sustained high levels of tone that make alternate bending or straightening very difficult or incoordinated, contractures of involved joints may be present

Range of Motion -

Range of motion refers to the amount of motion possible in a joint; it may be active range or passive range; it is evaluated in the limb used to access the equipment.

0 - normal - active range in major joints is at least 95% of normal range
1 - mild - active range is at least 75% of normal range
2 - moderate - active range is within 50% of normal range
3 - severe - active range is 25% or less of normal range

Method of Accessing -

0 - able to isolate a finger
1 - use of finger not isolated
2 - fist
3 - toe/foot
4 - head

Locomotion -

Locomotion refers not only to walking but also to propelling a wheelchair.

0 - normal - walks without braces, crutches or other aids safely, independently and within normal time limits for age
1 - mild - student walks with or without aids slowly or awkwardly but independently
2 - moderate - ambulates with assistance in classroom but is not independent nor safe; is able to propel own wheelchair on level ground functionally and safely
3 - severe - unable to propel a manual chair functionally in the classroom, in appropriate time nor safely

Language

Display Language -

0 - ability to spell at a minimum of 4.0 grade level
1 - ability to read at a minimum of 3.0 grade level
2 - ability to use a combination of Blissymbols and words at 2.0 grade level or less
3 - ability to use Blissymbols for communication
4 - ability to communicate using pictures

Response Length -

0 - respond using at least three word phrases
1 - respond using two word phrases
2 - respond using only one word
3 - respond with single letter/gestures

Spontaneity -

0 - spontaneous, unsolicited communication of more than one word/symbol
1 - spontaneous, unsolicited communication of one word/symbol
2 - solicited response, i.e. answer to question
3 - no response to question

TABLE 2

Table 2 displays the ranking of the twenty-five subjects used in compiling the data. A "0" indicates a high level of response.

	SENSORY										MOTOR								LANGUAGE		
	Visual			Auditory			Perceptual														
	Visual Attention	Acuity	Tracking	Attends to Auditory	Acuity	Discrimination	Tactile Defensiveness	Motor Planning	Figure Ground	Visual Discrimination	Degree of Involvement	Interfering Reflexes	Muscle Tone Upper	Muscle Tone Lower	Range of Motion Upper	Range of Motion Lower	Accessing	Locomotion	Display Language	Response Length	Spontaneity
1	2	0	0	2	1	1	0	0	NA	NA	1	0	2	2	0	0	0	1	4	1	0
2	-	-	-	2	0	2	0	0	NA	NA	1	0	0	0	0	0	0	0	4	1	2
3	1	0	0	2	2	2	0	0	0	1	1	0	3	3	1	1	0	1	2	1	2
4	1	0	1	0	0	1	0	1	0	1	1	0	3	3	0	0	0	1	2	2	2
5	1	0	0	0	0	0	0	3	NA	NA	3	3	3	3	1	1	4	3	2	0	0
6	3	1	3	2	2	2	1	1	0	0	2	0	2	2	0	0	0	1	2	1	1
7	1	0	1	1	0	0	0	1	1	1	1	0	2	2	0	0	0	1	2	0	0
8	2	2	2	1	0	2	0	1	1	1	2	1	1	1	0	0	1	3	2	2	1
9	1	0	1	0	0	0	0	3	0	0	3	2	3	3	2	3	1	3	2	2	2
10	2	0	-	2	0	2	0	2	1	1	2	1	2	2	0	0	0	2	2	0	0
11	1	0	0	0	1	2	0	0	0	0	2	1	2	2	0	0	0	1	2	0	0
12	3	0	3	2	0	2	1	1	1	1	2	1	3	3	2	2	0	3	2	2	2
13	2	0	-	1	0	0	0	0	0	0	2	0	2	2	0	2	0	2	2	1	1
14	0	0	2	3	3	3	0	0	0	0	1	0	2	2	0	0	0	1	2	1	1
15	1	0	3	0	0	0	1	1	1	1	2	2	2	3	0	0	1	3	2	0	0
16	1	0	1	0	0	0	1	1	1	1	2	2	2	3	0	0	0	3	2	0	0
17	0	0	0	0	0	0	0	0	0	0	2	2	2	2	3	2	2	3	0	0	0
18	1	0	0	2	0	2	0	0	0	0	2	1	3	3	0	0	0	2	2	2	1
19	2	2	3	0	0	0	0	3	1	1	3	3	3	3	3	3	4	3	2	2	2
20	0	0	0	0	0	0	0	0	0	0	1	0	3	3	2	2	0	1	0	0	0
21	0	1	0	0	0	0	0	0	0	0	1	1	2	2	0	0	0	1	0	0	0
22	0	0	1	0	0	1	0	1	0	0	2	2	2	3	0	0	0	3	3	0	0
23	0	0	0	0	0	1	0	1	0	0	2	0	3	3	1	1	0	1	3	0	0
24	0	1	0	0	1	0	0	0	0	0	2	1	2	3	0	3	0	3	1	0	0
25	0	1	0	0	0	0	0	3	0	0	3	2	2	2	1	1	4	2	0	0	0

COMMUNICATION AIDS

SPEAK AND SPELL

Manufacturer: Texas Instruments
P.O. Box 2500
Lubbock, Texas 79408

Cost: $ 60.00
(July, 1980)

I. Description:

The Speak and Spell is a battery-operated electronic learning aid that can be used as a communicator in the "secret code" mode. The letters pushed on the keyboard light up an eight character display and the letter names are "said" by the aid.

II. Size:

- Height: 10 inches
- Length: 7 inches
- Width: 1 inch
- Weight: approximately 8 ounces

III. Portability:

- May be carried from area to area
- May be carried by handle with one hand

IV. Interfaces:

- Available from manufacturer: additional word modules
- Able to adapt: none

V. Accessories:

- Available from manufacturer: none
- Able to adapt: none

VI. Display capabilities:

- Eight letters at a time
- No line or page capabilities
- No space key
- Correct single error at time error is made

VII. Output/feedback options:

- Audible: letter and word already programmed into machine
- Tactile: letters raised on keys
- Visual: eight letter LED display

VIII. Location of equipment:

- Table, floor, lapboard, lap

IX. Ease of operation:

- On/off switch accessible to user
- Automatic shutoff after five minutes of nonuse
- Volume not adjustable
- Keys ¼-inch in diameter and ¼-inch apart on keyboard

X. Cleaning:

- May be cleaned without adaptation in one to five minutes
- Dampness on surface of keyboard will affect performance of aid

XI. Power source:

- Four "C" Alkaline batteries
- Charge lasts approximately 15 hours
- Does not self-charge

XII. Service availability:

- Maintenance and repair available in many areas --

Orlando: Texas Instrument Exchange Center
1850 Lee Road, Suite 115
Winter Park, Florida 32789

- Maintenance done by family

XIII. Durability:

- Warranty on defective materials or workmanship for one year for original owner

XIV. Instruction manual:

- Good: two available
- One written for adult that is easy to read
- One written in comic form for student

XV. Comments:

- Push button keys are vulnerable to hard use

- Excellent teaching aid
- Prerequisite to use of keyboard alphanumeric communication aids
- Company presently distributes a new model with a pressure-sensitive surface replacing the raised keys

SPEAK AND SPELL

Step 1: Turn on machine by pressing "on" button (demonstrate).

Step 2: Press "secret code" key.

Step 3: Press letter:

A
F
E
L
O
R
U
X

Step 4: Press "erase" to make letters disappear.

Step 5: Spell words below; erase between each word:

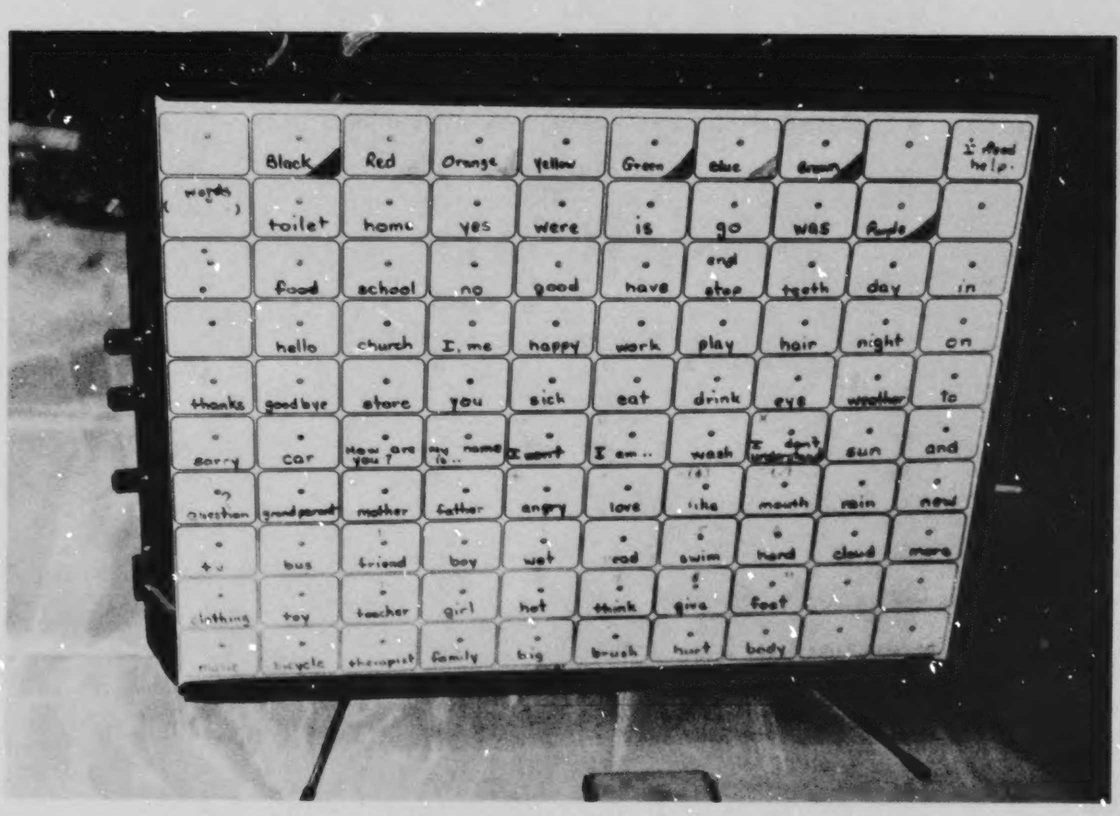
pan
see
look
word
meat
your

Step 6: Ask student to spell his name.

Step 7: Ask student to tell you something.

ZYGO COMMUNICATION SYSTEM

MODEL 100



Manufacturer: Zygo Industries Inc.
P.O. Box 1008
Portland, Oregon 97207

Cost: $1,195.00
(March, 1981)

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I. Description:

The Zygo 100 is a battery-operated row/column scanning device. By light pattern movement requiring two activations of an operating switch, it allows a user to select a single message from within a 10 by 10 matrix. The model 100 has a memory that will hold sixteen messages in the order of their selection.

II. Size:

- Height: 18 1/2 inches
- Length: 15 inches
- Width: 3 3/4 inches
- Weight: 14 pounds

III. Portability:

- May be carried in two hands
- May be mounted on wheelchair
- May be carried from area to area

IV. Interfaces:

- Available from manufacturer:

tread switch*
long leaf switch
pneumatic switch/squeeze ball
touch switch
slot selection control
short leaf switch
pointer selection
thumb switch

- Able to adapt:

rocking lever switch
sip/puff switch
tongue switch

V. Accessories:

- Available from manufacturer:

battery charger*
stand*
adaptive fixtures
educational programs (for Zygo 16 model)
display panels (Matrix)*
cable assemblies
wheelchair mounting kit

*Item comes with base unit.

- Able to adapt:

  video monitor
  page printer

VI. Display capabilities:

- 95 pictures/words/phrases/symbols/letters
- Possible to add overlays for advanced students
- Line and page printing only available with adaptations
- Unable to correct errors
- Memory feature of up to 16 messages in the order of selection

VII. Output/feedback options:

- Audible: call signal
- Visual: red lights, adapt to video display and printer

VIII. Location of equipment:

- Table, lapboard, floor, wheelchair mounting

IX. Ease of operation:

- On/off switch not accessible to most users
- Automatic and user-activated system for deactivation
- Scanning speed adjustable by evaluator
- Selection speed adjustable by evaluator

X. Cleaning:

- May be cleaned with adaptations in one to five minutes
- Dampness on plexiglass cover of display is no problem

XI. Power source:

- AH sealed batteries, rechargeable
- Charge lasts 15 hours
- Aid cannot be run while recharging. Recommend charging each night.

XII. Service availability:

- Maintenance and repair available from manufacturer:

  Zygo Industries, Inc.
  Post Office Box 1008
  Portland, Oregon 97207

XIII. Durability:

- One year warranty from date of sale on parts and labor

XIV. Instructional manual:

- A temporary manual gives minimal amount of information necessary for operation of the aid
- A more extensive manual is being developed

XV. Comments:

- Twenty-five item display matrix (overlay) allows for flexibility in programming for younger or severely motorically involved students.
- On Zygo 100 display, central location of red lights is distracting to students. It makes symbol/picture programming difficult.
- The slot selection control was not available at CSEC for these equipment trials. It would allow a single entry scan.
- The only printer that is compatible with the Zygo 100 requires spelling of each word in the message.
- The Zygo Company shared schematic drawings allowing our center to interface the Zygo 100 with an Apple II Plus microcomputer for word/phrase/spelling message output on a video monitor and full-page printer.

ZYGO 25

Step 1: Introduction

Teach use of machine.

- This machine is a scanner. The lights light up across the entire row, moving down the rows to the bottom, then begin again until the switch is pushed (demonstrate).
- When the switch is pushed all the lights go out except for the one moving (horizontally) across the row. When it reaches the end it comes back to the beginning until the switch is pressed (demonstrate).
- It will flash for a short time. This is how selection is made. Find the message first and watch it. When it lights up, press the switch. When it lights up again, press the switch again. Now a choice has been made.

Briefly review vocabulary.

Step 2: Ask student to indicate words below. If student has difficulty finding correct choice, point to the word and repeat command. (If student needs cues, put "c" by command on data sheet.)

toilet
I
go
school
mother
drink
food
friend
wash

Step 3: Ask student to indicate the phrases below. Cue if necessary.

I play
mother home
father not

Step 4: Ask student to indicate the phrases below. Cue if necessary.

I want drink
friend go school
you wash car

Step 5: Ask student to answer following questions:

Tell me hello?
Did you swim today?
What do you do at home?

Step 6: Ask student to tell you something.

Step 7: Scan off message light.

- To turn machine off, scan to row 10. Allow light to go off the end of the row. All the lights will go off.
- To turn machine back on, press switch again and hold down until top row lights up.

- To put messages in memory when the memory light is on, indicate desired spaces as before. When finished, turn memory off.
- To turn memory off, press at row nine (9), then at column ten (10) (same as to turn on). Do this before asking the machine to replay the message.
- To get the attention of the listener when you have completed your message, use the "I need help" square (row 1, column 10). When you use this square a light flashes and there is a beep which continues until you turn it off. This can be done by the listener or you can do it by depressing at the same square (demonstrate).
- To have the machine replay your message, press switch at row nine (9), then at column nine (9) (show correct space). (There is a delay at which time the light in row 1, column 1 flashes to tell you there is space in the memory.) It will continue to replay until another light selection is made.
- To erase the memory, press the switch at row ten (10), then at column nine (9) (show correct space). This will take all the messages out of the memory.
- Ask student to turn on memory, then put in "I like to swim. Friend love to read." Activate recall and after message has replayed, erase memory.
- Ask student to activate memory, put in his own message, replay, then erase.

Step 10: Turn machine off.

ZYGO 100

Step 1: Review vocabulary on ninety-five word board.

Step 2: Ask student to indicate the items below. Cue if necessary.

1
3
9
thanks
sick
to
music
brush
more

Step 3: Ask student to indicate phrases below. Cue if necessary.

friend play
mother go
T.V. on

Step 4: Ask student to indicate phrases below. Cue if necessary.

I want food
weather is hot
girl brush teeth

Step 5: Ask student to answer following questions.

How do you feel today?
Who lives at your house?
Where do you like to go?

Step 6: Explain function of color.

- Indicate square saying "color." This tells the listener you are going to tell him a color. Then indicate the square(s) containing the color(s) you want (demonstrate).
- Ask student to indicate the colors blue and red.

Step 7: Explain function of number.

- Indicate square saying "number." This tells the listener you are going to tell him a number. Then indicate the square(s) containing the number(s) you want (demonstrate).
- Ask student to indicate the numbers 2, 5, and 8.

Step 8: Explain function of alphabet.

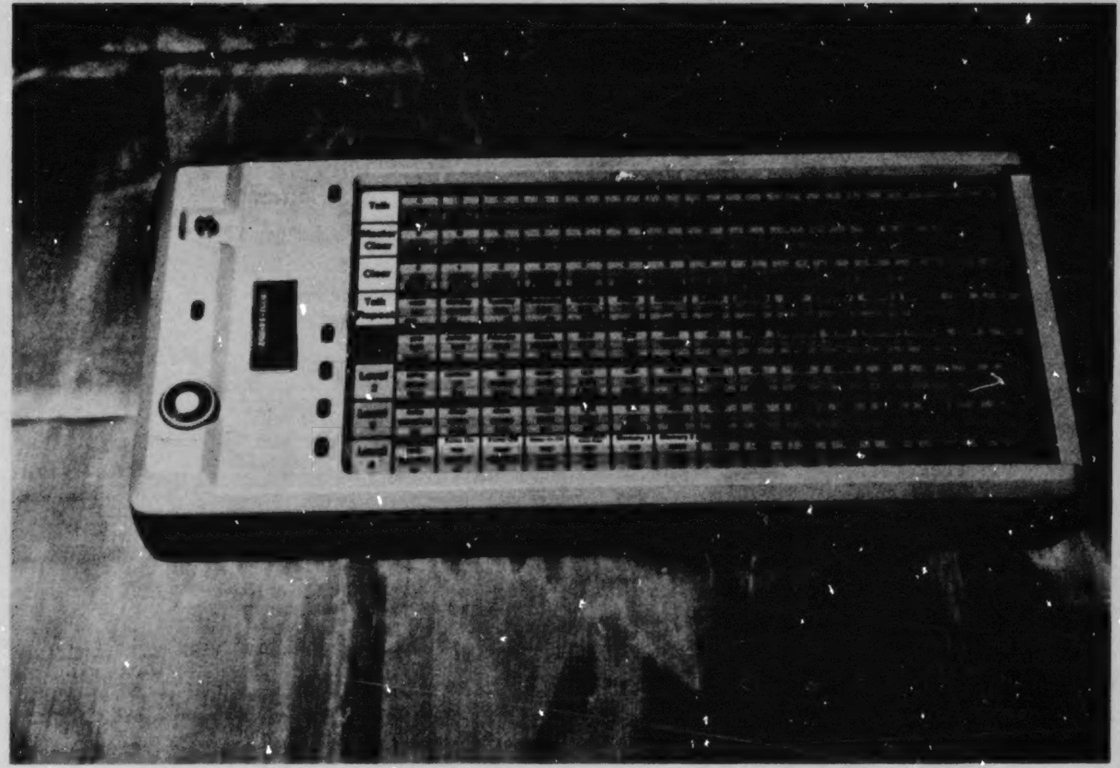
- Indicate square saying "alphabet" and word. This tells the listener you are going to spell. Then indicate the square(s) containing the letter(s) you want (demonstrate). When finished with the alphabet, indicate word.
- Ask student to indicate the letters A, L, N, and V.
- Ask student to spell his/her name.

Step 9: Explain memory functions.

- The machine will remember sixteen (16) messages so that you can say more than one message at a time. To turn memory on, press switch at row nine (9), then at column ten (10) (show correct space). This turns memory light on. The red light stays on to tell you the memory is working.

PHONIC MIRROR HANDIVOICE

Model 110



Manufacturer: H.C. Electronics, Inc.
250 Camino Alto
Mill Valley, California 94941

Cost: $2,595.00
(March, 1981)

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I. Description:

The Handivoice 110 is a portable battery-operated electronic speech synthesizer. It has a preprogrammed vocabulary that includes 473 words, sounds and phrases. The vocabulary and operating modes are arranged in four levels which are accessed through 128 touch-sensitive squares. Example: first touch the square marked "level 1." The first word listed in any other square will be "spoken" when that square is touched. The Handivoice allows the user to create a message and play it back. The Handivoice has a memory feature.

II. Size:

- Height: 16.3 inches (41.3 cm)
- Length: 7.4 inches (18.79 cm)
- Width: 2.5 inches (6.25 cm)
- Weight: 5 pounds, 14 ounces (with battery pack)

III. Portability:

- May be moved from area to area
- May be carried on a wheelchair
- May be mounted on a wheelchair

IV. Interfaces:

- Machine is not equipped with any interfaces but it may be activated with fingers, head or mouth stick

V. Accessories:

- Available from manufacturer:

wire guard
shoulder strap
charger*
single level word overlays
blank overlay

- Able to adapt:

user made picture/symbol overlays

VI. Display capabilities:

- Correctability: able to correct single error at the time an error is made

*Item comes with base unit.

VII. Output/feedback options:

- Audible only

VIII. Location of equipment:

- Bed, table, lapboard, lap, floor, wheelchair

IX. Ease of operation:

- On/off switch accessible to user
- Moderate amount of pressure to depress switch
- Volume control accessible to user
- Rate and pitch control

X. Cleaning:

- Easy to clean surface with adaptations in one to five minutes

XI. Power source:

- Internal nickel cadmium rechargeable batteries
- Length of charge -- 10 hours
- Machine can be operated while charging
- Charge only when machine indicates need

XII. Service availability:

- Maintenance and repair available from manufacturer:

  H. C. Electronics, Inc.
  250 Camino Alto
  Mill Valley, California 94941

- Warranty -- one calendar year from date of shipment of equipment

XIII. Instructional manual:

- Good description of machine and its operation

XIV. Comments:

- Immediate auditory feedback is reinforcing and motivating to the user
- The synthetic voice sounds like an adult male

- Message can be replayed with normal fluency regardless of time required to input message
- Vocabulary should be reorganized in a functional language pattern

HANDIVOICE OVERLAY

Beginning Program

Step 1: Operation of machine

- To turn on the machine, press on/off switch at upper left corner (demonstrate).
- To put in the message, find the desired picture, press the color key, then the black square in your picture (demonstrate).
- To have the word said again, touch "talk" (demonstrate). If you want to have it repeated more than once, touch "talk repeat" (demonstrate).
- To erase the total message touch "master clear" (demonstrate).
- To erase the last word only, touch "clear" (demonstrate).

Step 2: Using Group I overlay (3 pictures)

Ask student to indicate the words below by touching the black square in the picture. Cue if necessary.

bathroom
food
drink

Step 3: Using Group II overlay (9 pictures)

Ask student to indicate the words below by touching the black square in the picture. Cue if necessary.

hat
car
T.V.
coffee
book
store
typewriter
telephone
ice cream

Step 4: Using Group III overlay (7 pictures)

Ask student to indicate the words below by touching the black square in the picture. Cue if necessary.

dress
spoon
shoe
hat
comb
sweater
ball

Step 5: Using Group IV overlay (17 pictures)

Ask student to indicate the words below by touching the picture. Cue if necessary.

car
drink
newspaper
food
sandwich
coffee
T.V.
bathroom
typewriter

Step 6: Using Group I overlay (18 Blissymbols)

Ask student to indicate words by touching the Blissymbol. Cue if necessary. Select phrases from the following:

$$\text{I} \begin{pmatrix} \text{boy} \\ \text{girl} \end{pmatrix} \qquad \text{I} \begin{pmatrix} \text{go} \\ \text{play} \\ \text{eat} \end{pmatrix}$$

$\begin{pmatrix}\text{I}\\ \text{Mom}\\ \text{Dad}\end{pmatrix} \begin{pmatrix}\text{happy}\\ \text{sad}\\ \text{hungry}\end{pmatrix}$

$\begin{pmatrix}\text{hello}\\ \text{goodbye}\\ \text{thanks}\end{pmatrix} \begin{pmatrix}\text{Mom}\\ \text{and}\\ \text{teacher}\end{pmatrix}$

I love $\begin{pmatrix}\text{Mom}\\ \text{Dad}\\ \text{family}\end{pmatrix}$

I like $\begin{pmatrix}\text{Mom}\\ \text{Dad}\\ \text{teacher}\end{pmatrix}$

$\begin{pmatrix}\text{my mom}\\ \text{my dad}\\ \text{my teacher}\end{pmatrix} \begin{pmatrix}\text{sad}\\ \text{happy}\\ \text{hungry}\end{pmatrix}$

I can $\begin{pmatrix}\text{play}\\ \text{eat}\end{pmatrix}$

HANDIVOICE OVERLAY - Words or Blissymbols

Step 1: Operation of machine

- To turn on machine, press on/off switch at upper left corner (demonstrate). The light will go on.
- There are four levels or colors of words: red, yellow, blue and orange. The color selection squares are located at the bottom left hand corner (demonstrate).
- To put in your message, find the word/symbol you want, press the correct color key, then your word/symbol (demonstrate). Repeat with as many messages as you want.
- To have whole message repeated, touch "talk" (demonstrate).
- If you want to have it repeat the message, touch "talk repeat" (demonstrate).
- To erase the total message touch "master clear" (demonstrate).
- To erase the last message only, press "clear" (demonstrate).

Step 2: Ask student to indicate the word/symbol below. Cue if necessary.

I
family
work
give
walk
love
I am
hello
no

Step 3: Ask student to indicate the word/symbol below. Cue if necessary.

you
bathroom
I (one)
in
How are you?
hair

Step 4: Ask student to indicate the phrases below. Cue if necessary. Have student use "talk" and "master clear" after each phrase.

my teacher
day wet
church music
brush hair
yellow boat
I am wet

Step 5: Ask student to indicate the phrases below. Cue if necessary. Have student use "talk" and "master clear" after each phrase.

I have sister
I want hot food
My house is brown

Step 6: Ask student to tell you something.

Step 7: Ask student to turn off the machine.

HANDIVOICE - Level 1 & 2 Overlay

Step 1: Ask student to indicate level 1 words below. Cue if necessary.

I
love
friend
my name is
hello
no
I want
sick
hungry

Step 2: Ask student to indicate level 2 words/letters below.

m
e
January
10
today
ear
sky
sleep

Step 3: Ask student to indicate the phrases below. Cue if necessary. Have student use "talk" and "master clear" after each phrase.

I love my mom
I'd like my work
the next word spell
____________(any word student wishes)
I can read
My name is __(spell)____
My hand is hurt

Step 4: Ask student to tell you something.

Step 5: Ask student to turn off the machine.

HANDIVOICE - NO OVERLAY

Step 1: There are four words, phrases, numbers or letters in each square. When selecting the one you want, be sure you have pressed the appropriate corresponding color.

Step 2: Ask student to indicate words below. Cue if necessary.

girl	March
six	red
egg	T.V.

Step 3: Pause: Adds a space between entries in order to end a sentence or indicate a new thought. Ask student to indicate sentences below, add pause between sentences.

I don't understand. I need help.
I'm fine. How are you?

Step 4: Echo On/Echo Off: To turn off voice output immediately after entry, press "echo off." To return to immediate voice output, press "echo on." (Note: machine will automatically return to immediate voice output when machine is turned off.) Ask student to press "echo off," put in messages below, replay, then "master clear."

I am hungry.
The dog is small.

Step 5: Beep On/Off: This square will turn on "beep" signal which can be used when "echo" is off to tell you your message is being remembered. Ask student to indicate messages below with "echo" off and "beep" on. "Talk" and "master clear" after each message. At end of last message turn "beep" off and "echo" on.

I am excited.
My finger is tired.
Open the machine, please.

Step 6: Phrase Mode Save/New: Allows you to construct a statement, play it back, add another phrase, play back both, and so on--up to forty (40) entries. Press square and you will hear "phrase saved after talk." You may enter a message, play it back, enter another message, then both will play back (demonstrate). Ask student to press "phrase mode save," put in first part of message below, press "talk," put in second part of message, press "talk."

Today is hot (talk). I want to swim (talk), or have a cold drink (talk).

Press "phrase mode save" again. The machine will say "new phrase after talk." Press "talk" (message will repeat). Now press "I" then "talk." The machine will only say "I."

Step 7: Memory 2: If you want to construct a message for later use, press "memory 2." You may now put in a message, then go back to memory 1 (that's where the machine usually is). The message in memory 2 will stay there until you repress "memory 2," have your message "talk" then "master clear" (demonstrate). Ask student to press "memory 2," put in his own message, turn off memory 2 and press "I'm ready," then "talk repeat" until demonstration instructs you to play your message in memory 2. After playing, press "master clear."

Step 8: Alphabet: If the word you want is not on the Handivoice, you may spell it. First press "the next word is spelled," then spell your word. Ask student to spell the following words:

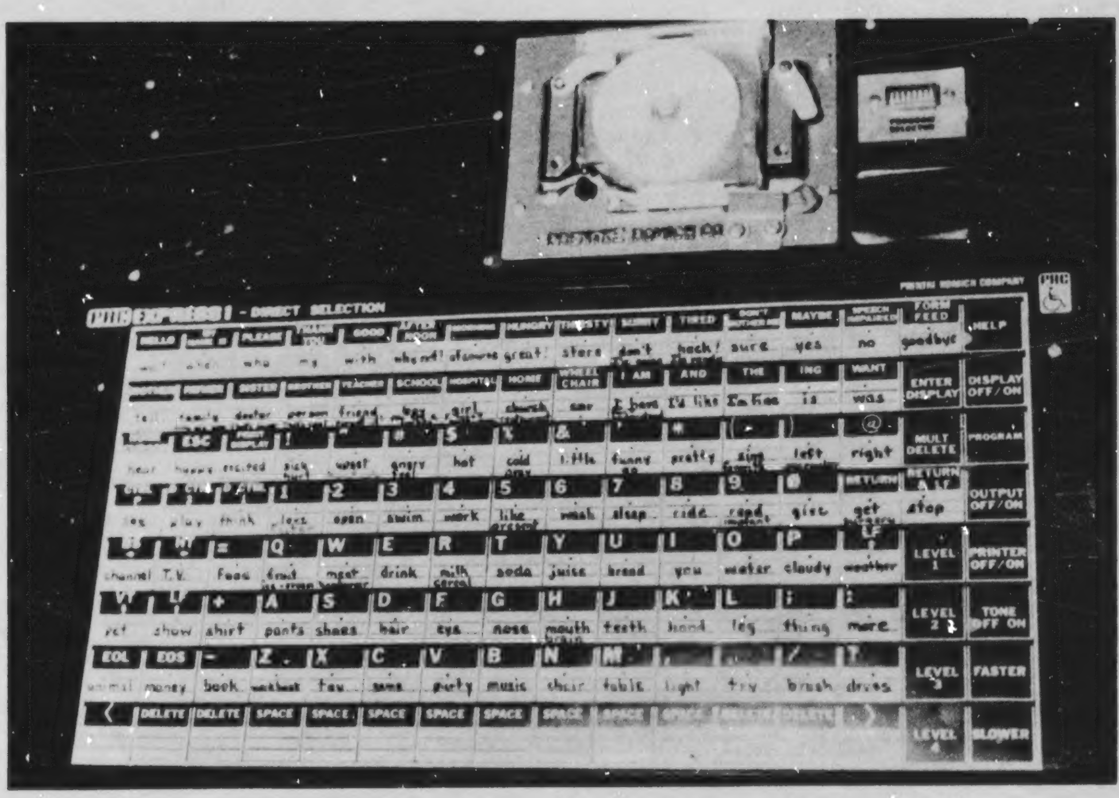
his/her name
pillow

Step 9: Prefixes and Suffixes: If you want to add beginnings or endings to your words you may use the prefixes and suffixes in orange row 4 (demonstrate "light-ly" and "go-ing"). Ask student to indicate words below.

thinking
sugarless
playful
one of student's own

Step 10: With machine off, ask student to program a message for you.

EXPRESS I



Manufacturer: Prentke Romich Company
Rd 2, Box 191
Shreve, Ohio 44676

Cost: $2,380.00
(March, 1981)

I. Description:

The Express I is a microprocessor based electronic communication device. It is portable and battery-operated. It features scanning, encoding or direct selection modes. The first level comes preprogrammed by the company to the user's specifications. Levels 2, 3 and 4 may be programmed by the user. There is a possibility of eight characters in each location in the second and third levels and sixteen characters in the fourth level. The only locations that cannot be programmed are those that can be selected from any level.

II. Size:

- Height: 14.5 inches
- Length: 18.5 inches
- Width: 3.5 inches
- Weight: 9.5 pounds

III. Portability:

- May be carried from area to area
- May be carried on wheelchair laptray
- May be mounted on wheelchair

IV. Interfaces:

- Available from manufacturer:

optical light sensor
hand held sensor*
rocking lever switch (RL1M)*
wobble switch
joy stick
sip/puff switch
tongue switch
pneumatic switch
EMG switch
arm slot control
chin control switch

- Adaptable with "Y" connector:

tread switch
leaf switch
touch switch
thumb switch
short leaf switch

*Item comes with base unit.

V. Accessories:

- Available from manufacturer:

  battery charger*
  thermal paper (3)*
  wheelchair mounting kit
  extended overlay cover
  perforated overlay grid
  display overlays (one direct selection, one scanning)*
  snap on stand
  cover (not yet available)
  television memory connection
  page printer connection
  computer connection
  Blissymbol overlay

- Able to adapt: none

VI. Display capabilities:

- 365 symbol/word/phrases on 1 inch by 1 inch squares

- Prints on single line tape

- May be adapted for page printer

- Correctability:
  - Single error at the time of error
  - Multiple errors made in succession
  - Unable to correct after print command

VII. Output/feedback options:

- Audible: scanning tone, acceptance tone and call signal

- Visual:
  - LED display of 0.25 inch upper case letters
  - Strip printer 0.1 inch upper case letters on on 0.25 inch wide paper
  - May be adapted to video display or page printer

VIII. Location of equipment:

- Table, floor, lapboard, adapt for bed, wheelchair mounting

IX. Ease of operation:

- On/off switch not accessible to user

- User may deactivate display and printer

- Speed of scan adjustable in twenty-five percent increments by user

- Audible beep may be turned on or off by user

*Item comes with base unit.

X. Cleaning:

- May be cleaned without adaptation in one to five minutes
- Dampness on plexiglass cover of display is no problem

XI. Power source:

- Ten "C" nickel cadmium rechargeable batteries (main)
- Three "C" nickel cadmium rechargeable batteries (RAM)
- Charge lasts 12 hours
- Machine will operate while being charged, does not need to be run down to recharge, cannot overcharge
- Recharge using Dormeyer PS 7001P-D 120 volts A.C.

XII. Service availability:

- Maintenance and repair available from manufacturer:

  Prentke Romich Company
  Road 2, Box 191
  Shreve, Ohio 44676

XIII. Durability:

- Two year warranty on parts and labor, half price on natural cause damage, i.e. lightning

XIV. Instructional manual:

- It provides a good description of the machine and its operation. The manual is well-illustrated and written for the consumer. No training materials.

XV. Comments:

- The machine used at the Communication Systems Evaluation Center has required no repair. It has been in daily operation at one location for seven months. Minor problems have been handled over the telephone with the company engineer.
- The company is very helpful.
- The joy stick must have an additional connection so that it can be used in conjunction with the rocking lever switch in the manual selection mode.
- All switches sent for repair have been returned within one week.

- The user may program vocabulary in and out without fear of running out of memory space.
- Selection delay time may be programmed to retain that speed indefinitely.

EXPRESS I - DIRECT SELECTION

Step 1: Operation of Machine

- The on/off switch is on the upper right side of the machine behind the display. To turn it on, push on/off switch away from you. No lights will go on until first selection is made.
- There are four levels of programs of words/phrases in each position on the display. To select the level you want, indicate level 1, 2, 3 or 4 with light. For this program we will use level 1 (printout).
- To put in your message, find the word(s), phrase(s), letter(s) or number(s) you want, and hold the light activator over the position until the red light comes on (demonstrate). Your message will be seen, four characters at a time, on the LED display (red box at upper right). When you enter a second message, your first message will be printed on the tape (demonstrate). You cannot enter a new message until the LED display is finished. You will hear a beep. Repeat with as many messages as you want.
- To erase a whole word or phrase, activate "mult-delete" (demonstrate). (Must be whole word activated--not spelled word.)
- To erase a letter error when spelling a word, activate "delete" (demonstrate).

Step 2: Ask student to indicate the words below. Cue if necessary.

mother
school
thirsty
three
O
H
I am
hello
I'm speech impaired

Step 3: Ask student to indicate the phrases below. Cue if necessary.

good morning
I am hungry
I am sorry
please help (explain)

Step 4: If the word you want is not on the board, you may use the letters to spell. Remember to space after each word. Ask student to indicate words below.

dog
ball
pines
quiet

Step 5: When writing sentences you need to use the punctuation marks (point out). Ask student to write sentences below, using punctuation.

My name is ___(spell)___.
I go to school.
How are you today?

Step 6: Ask student to respond to questions below.

What do you like to do for fun?
What do you like best to eat?

Step 7: Ask student to print his own message.

Step 8: Faster/Slower

- If you want the light to respond faster when you indicate your selection, indicate "faster." Each time you hear a beep it is increasing the speed.
- If you want the light to respond slower when you indicate your selection, indicate "slower." Each time you hear a beep it is decreasing the speed.
- Ask student to increase speed three times then decrease it three times.

  (There is approximately a 1/2 second change each time it beeps.)

Step 9: Enter Display

- If you have letters in your LED display and you want to have them print without putting in another word, indicate "enter display."
- Ask student to put in "wheelchair," then "enter display."

Step 10: Tone

- If you do not want the machine to beep, indicate "tone."
- The first indication turns beep off; the second turns beep on.
- Ask student to turn beep off, then on.

Step 11: Space

- To get your written message out from under the plastic cover (to tear off) indicate "space." You will need to do this several times on different "space" areas. Ask student to tell you something, indicate "enter display," then "space" until message is out from plastic cover.

Step 12: Ask student to turn off machine.

EXPRESS I - SCANNING

Step 1: Operation of machine

- The on/off switch is on the upper right side of the machine behind the display. To turn on, push on/off switch away from you. No lights will go on until first selection is made.
- There are four levels of programs of words/phrases in each position on the display. To select the level you want, indicate level 1, 2, 3 or 4. For this program we will use 1.
- To put in your message, activate the switch. This will start the lights coming down the display. When the light reaches the word/letter you want, activate the switch. The light will now go across the row. When it reaches the word you want, activate the switch again. Your message will be seen, four characters at a time, on the LED display (red box at upper right). When you enter a second message, your first message will be printed on the tape. You cannot enter a new message until the LED display is finished. You will hear a beep. (Demonstrate above procedure with the words "please" and "hungry.") Repeat with as many messages as you want.
- To erase a whole word/phrase, activate "multi-delete" (demonstrate with word).
- To erase a letter error when spelling a word, activate "delete" (demonstrate with letter).

Step 2: Ask student to indicate the words/letters below. Cue if necessary.

F
M
5
0
please
chair
9
yes
I am speech impaired

Step 3: Ask student to indicate the phrases below. Cue if necessary.

good morning
I am hungry
I am sorry
please help (explain)

Step 4: If the word you want is not on the board, you may use the letters to spell. Remember to space after each word. (Show space row 7, column 11. "Space" on row 1, column 1 does not space.) Ask student to indicate words below.

dog
ball
pines
quiet

Step 5: When writing sentences you need to use the punctuation marks (point out). Ask student to write sentences below, using punctuation.

My name is ___(spell)___.
I go to school.
How are you today?

Step 6: Ask student to respond to questions below.

What do you like to do for fun?
What do you like best to eat?

Step 7: Ask student to indicate own message.

Step 8: Faster/Slower

- If you want the light to respond faster when you indicate your selection, indicate "faster." Each time you hear a beep it is increasing the speed.
- If you want the light to respond slower when you indicate your selection, indicate "slower." Each time you hear a beep it is decreasing the speed.
- Ask student to increase speed three times, then decrease it three times.

(There is approximately a 1/2 second change each time it beeps.)

Step 9: Enter Display

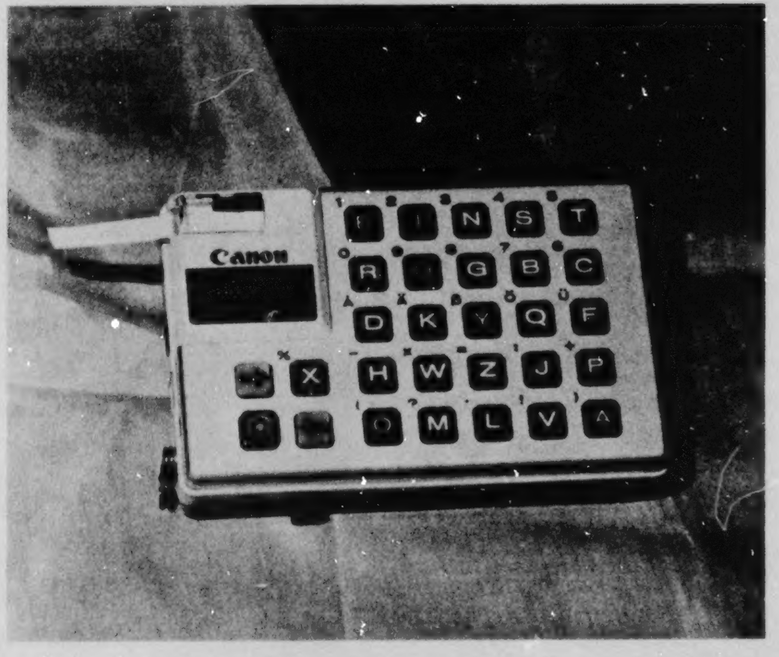
- If you have letters in your LED and you want to have them print without putting in another word, indicate "enter display."
- Ask student to put in "wheelchair," then "enter display."

Step 10: Tone

- If you do not want the machine to beep, indicate tone.
- The first indication turns beep off; the second turns beep on.
- Ask student to turn beep off, indicate "sister," turn beep on, then "enter display."

Step 11: Ask student to turn machine off.

CANON COMMUNICATOR



Manufacturer: Canon Inc.
P.O. Box 50
Tokyo Airport, Japan

Distributor: Telesensory Systems, Inc.
3408 Hillview Avenue
Palo Alto, California 94304

Cost: $ 599.00
(March, 1981)

I. Description:

The Canon is a lightweight battery-operated electronic device. The battery pack is separate from the keyboard unit, and is connected to it by one of two interchangeable cords of different lengths. Canon has keyboard input with letters arranged in accordance with letter frequency analysis. Use of the shift key makes available twenty-six additional letters and numerals. Messages are made permanent on the strip of printed tape.

II. Size:

- Keyboard unit:
  - Height: 5 3/8 inches (13.1 cm)
  - Length: 3 1/2 inches (8.5 cm)
  - Width: 1 3/8 inches (3.0 cm)
  - Weight: approximately 10 ounces (280 g)
- Battery pack:
  - Height: 3 1/2 inches (7.0 cm)
  - Length: 3 5/8 inches (8.75 cm)
  - Width: 7/16 inch (1.9 cm)
  - Weight: approximately 5 1/4 ounces (150 g)

III. Portability:

- May be carried from area to area
- May be mounted on wheelchair
- May be hung on neck
- May be worn on wrist

IV. Interfaces:

- Available from manufacturer: none
- Able to adapt: none

V. Accessories:

- Available from manufacturer:

battery charger (CH-1A or CH-1)*
keyboard covers, one thin (2.5 cm) and one thick (4 mm)*

*Item comes with base unit.

braille dummy keyboard*
armbelt and armbelt extension*
neck strap*
soft case for Canon*
battery pack case*
print tape in twenty (20) rolled packs (#1)*
shift cover*
rain cover (clear plastic)*

- Able to adapt: none

VI. Display capabilities:

- Alphanumeric keyboard

- Dot print on ¼-inch single line tape

- Print magnified by print window

- Correctability: single error at time of error

VII. Output/feedback options:

- Audible: none

- Visual: prints 2.2 mm by 3.1 mm letters

VIII. Location of equipment:

- Hand, table, fastened to arm or leg, carried on a neck strap, fastened to the arm of a wheelchair

IX. Ease of operation:

- On/off switch accessible to user

- Red telltale light to indicate when on

X. Cleaning:

- Easy to clean in one to five minutes without adaptations

- Dampness on keyboard affects use

XI. Power source:

- Nickel cadmium rechargeable battery charge lasts seven hours.

- Machine will operate while being charged and does not need to be run down to recharge.

- Battery pack life expectancy is approximately two years.

*Item comes with base unit.

XII. Service availability:

- Maintenance and repair available from manufacturer:

  Canon, Inc.
  Post Office Box 50
  Tokyo Airport, Japan

- Minor maintenance by family

XIII. Durability:

- Limited warranty for one year from date of purchase

- No maintenance agreement is available

XIV. Comments:

- Two Canons have been used at the Communication Systems Evaluation Center for about seven months and have been carried from home to school and in some social situations. Repairs have been required when both machines malfunctioned. They were returned and a decoder chip was replaced under warranty.

- The paper is sensitive and will turn brown and illegible if exposed to light or adhesive tapes.

- There is no comma or apostrophe.

CANON COMMUNICATOR

Step 1: Operation

- Press power switch in to turn on the machine (demonstrate). Check to see if power lamp is lit. Ask student to turn it on.
- Press space key several times to check tape movement (demonstrate). Ask student to press space key.
- To write message, press appropriate letters (demonstrate).

Step 2: Ask student to indicate letters below. Cue if necessary.

E
G
F
H
J
M
A
X

Step 3: Ask student to print words below. Cue if necessary. Demonstrate spacing between words.

dog
mother
name
built

Step 4: Ask student to print phrases below. Cue if necessary.

I hot
you go
father work

Step 5: Error Correction

- If you make an error, press "backspace" key until the letter you wish to erase disappears from view window, then press desired letter (demonstrate). Do not use error correction more than ten times in succession.
- Ask student to print words below with error word first, then correct.

cab--cat
hone--home
cald--cold

Step 6: Operation of Shift

- To use numbers or symbols seen at upper left hand corner, press the "shift" key (demonstrate).
- Ask student to print the symbols below.

2
=
. (period)

- Ask student to print the following:

3 + 4 = 7
(yes)
Where are you?
I am at school.

- Ask student to tell you something.

Step 7: Ask student to give you a spontaneous message.

Step 8: Tearing off Message

- To tear off message, space until message is no longer under plastic window (seven times). Pull paper back toward "E" then down toward "o."
- Ask student to print a message of his choice, then tear off.

Step 9: Operation of Battery

- To attach battery pack, plug straight end of cord into the battery pack (demonstrate). Plug "L" end of cord into machine on left hand side, face cord down (demonstrate). Ask student to do both functions. There are two cords provided--a short and long cord.
- You should plug the Canon battery pack into the battery charger every night. To do this, unplug the battery pack from the Canon, disconnect the battery pack into the charger the same way you did for the machine. Plug battery charger into wall plug. Leave overnight, but not for two or three days. If the power light goes off or the printout is not clear, you need to charge the battery.

Step 10: Loading the Paper

- Turn power switch off and remove battery pack cord.
- Turn Canon over on the table, press the back cover lock. Open back cover when it lifts.
- Lift up tape clip. Remove remaining tape.
- Pull out beginning of new tape, roll about 10 cm.
- Place new tape roll on tape spindle with its beginning on tape exit side. Press down tape clip to hold tape in place.
- Insert tape through tape exit, twisting it so that its outside will be facing down. Keep inserting until tape comes out the other side.
- Close back cover and lock it tightly.
- Demonstrate the above steps.

Step 11: Keyboard Covers (thick and thin)

- Cut off the tape.
- Put keyboard cover on, make sure catch slides into keyboard. Notch (clicks).
- Demonstrate, then have student put on the keyboard.

Step 12: Armbelt Attachment

- Tie armbelt around arm with rail side up.
- Pull belt straps through two rings, then fold them over and press to tighten. If armbelt is too long, put pad between arm and armbelt. If too short, connect extension belts to armbelt.

- To attach Canon, turn Canon over. On back there are two armbelt coupler slots to slide in rails of armbelt. Insert rails into slots, push in Canon, checking to be sure rail edges are sliding under four flanges on Canon and that it is safely locked in. Push Canon until it comes to a full stop.
- Turn Canon around if desired.
- Demonstrate the above steps.

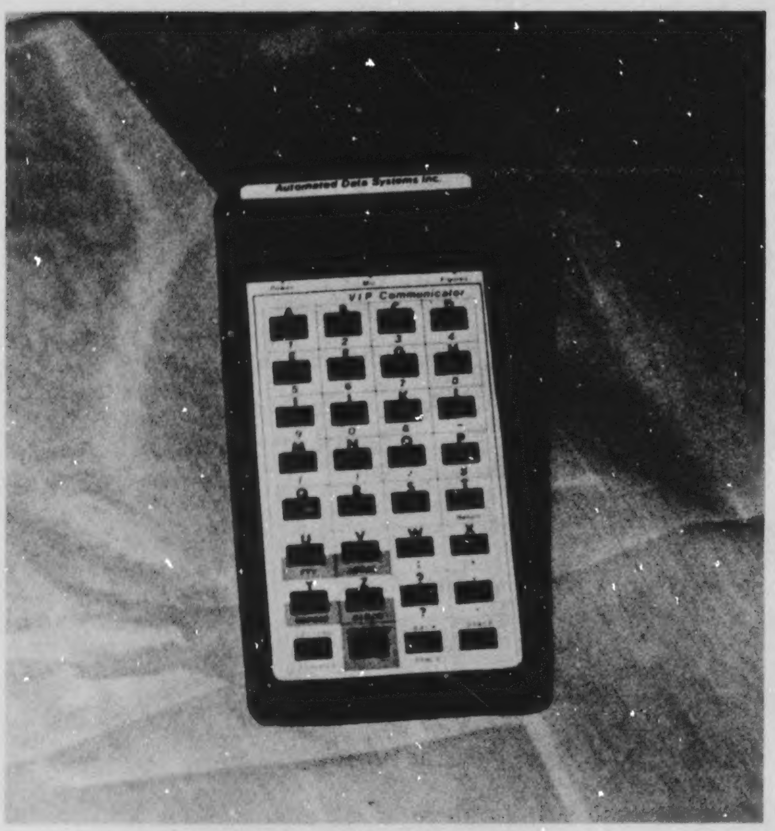
Step 13: Rain Cover

- To put on rain cover, disconnect battery pack, tear off paper, insert Canon into plastic cover making sure plastic is over view window (upper left hand corner). Turn with bottom side up and snap three snaps (demonstrate).
- Ask student to put cover on.
- Ask student to write a message, then remove cover.

Step 14: Leather Cover

- Ask student to put Canon into and out of leather cover.
- Ask student to put battery pack into and out of leather case.

VIP



Manufacturer: Automated Data Systems, Inc. (ADS, Inc.)
P.O. Box 4062
Madison, Wisconsin 53711

Distributor: Prentke-Romich Company
RD 2 Box 191
Shreve, Ohio 44676

Cost: $ 288.00
(March, 1981)

I. Description:

The VIP is a portable communication aid that features a direct selection keyboard and an eight character LED display. It can also be connected to a phone to communicate with a TTY. It has a repeat function.

II. Size:

- Length: 6 inches
- Width: 3 inches
- Weight: 9 ounces (basic unit)
- Depth: 1.5 inches

III. Portability:

- Easy to carry in one hand
- May be carried from area to area
- May be carried on wheelchair

IV. Interfaces:

- Available from manufacturer: none
- Able to adapt: none

V. Accessories:

- Available from manufacturer:

  magnetic pick-up phone
  acoustic pick-up
  acoustic pocket display (attached by pin or slip in pocket insert)

- Able to adapt: none

VI. Display capabilities:

- Eight character LED display
- Forty-five character repeat function
- Correctability:
  - Single error at time of use
  - Backspace key
  - Multiple error by use of "clear" key

VII. Output/feedback options:

- Audible: none
- Visual:
  - LED display
  - Red dot indicators for power, microphone and figures
  - Print capability through TTY connector

VIII. Location of equipment:

- Main unit:
  - Hand held, table, lapboard, floor
- Talking pocket:
  - Worn by user and restricted by length of connecting cable
  - Placed in view on edge of table, lapboard or bed

IX. Ease of operation:

- On/off switch usually accessible to user
- Keys are small and close together but easily depressed

X. Cleaning:

- Easy to clean in one to five minutes without accessories
- Dampness on keyboard affects use

XI. Power source:

- NICad type nickel cadmium rechargeable
- Recharge using Radio Shack 9 volts/225 ma only
- Main unit runs 4 to 5 hours on charge
- With Talking Pocket attached, runs 2 to 3 hours on a full charge
- Recharge takes 10 hours for full charge
- May be used while being charged

XII. Comments:

- Side keys inaccessible to some students
- Two options for space key

VIP

Step 1: Operation of Machine

- To turn on the machine, slide on/off switch down to "on." This button is located on the upper left hand side. A small red dot appears in the lower left hand corner of the LED (point out).
- To put in a message, press key(s) with a letter above it. This will cause that letter to appear on LED.
- To space between words, press key with "space" written above it.

Step 2: Ask student to indicate letters below. Cue if necessary.

B	R
K	W
M	Y

Step 3: Ask student to indicate words below, spacing between words. Cue if necessary.

dog	name
mother	built

Step 4: Clear Feature

- To clear your message out of the machine, press "features," then "clear" (demonstrate).
- Ask student to indicate phrases below, spacing between words and clearing at end of each phrase.

I hot
you go
father work

Step 5: Error Correction

- If you made an error, backspace to the error, then put in correct letters.
- Ask student to put in the incorrect words below, then correct.

cak--cat
hone--home
cald--cold

Step 6: Figures

- To use numbers and symbols seen under each key, press key with figures written underneath. When you do this a red light will go on at lower right hand corner of LED (point out). To turn off, repress same key.
- Ask student to print symbols below.

2 & / '

- Ask student to print the following:

(yes)
Where are you?
I am at school.
$1.95

Step 7: Repeat

- To have your message repeat, press "feature" key then "repeat" key (demonstrate). To get repeat to stop, press top black button on right side of machine. Hold for two seconds. Release button, then press "clear" to erase message.

Step 8: Ask student to indicate messages below. Repeat them, then erase.

hello
My name is ___________.

Step 9: Talking Pocket

- To attach the talking pocket, remove white cover on top of VIP. Press blue switch from pocket onto top of VIP with words at front. Attach pocket to shirt.
- Ask student to put in message below, repeat and clear.

I am using a VIP.

Step 10: Space Key on Side

- The lower black button on the right hand side is a space key. It works the same as the space key on the front. If you hold the VIP in your hand to use, it might be easier to use the side space key.
- Ask student to put in his own message using side space key.

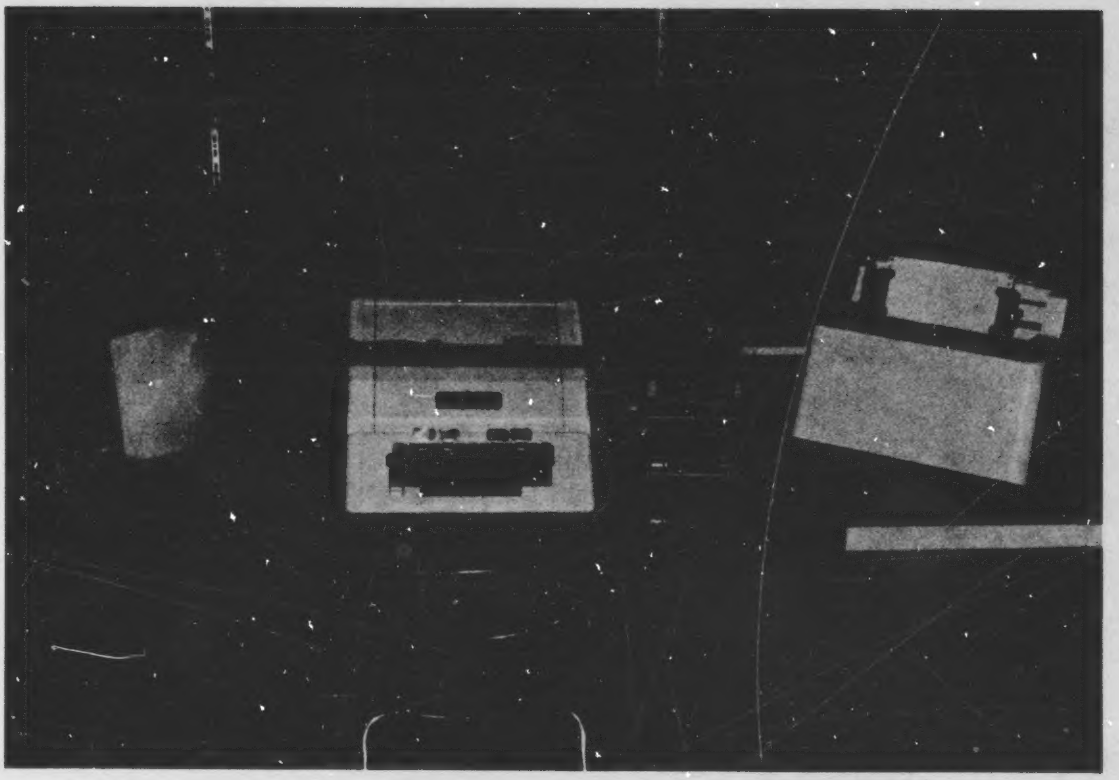
Step 11: Battery Charger

- The VIP will only work for 4 to 5 hours on a battery charge (2 to 3 hours with the talking pocket). You should charge it every night. To charge, turn off the VIP, plug charger into VIP at top right hand corner, then plug charger into the wall.
- Ask student to plug charger into VIP and then into the wall.

Step 12: Carrying Case

- VIP comes with carrying case. Both the VIP and pocket will fit. It is a good idea to keep them in the case when not in use. You should roll up talking pocket cable flat.
- Ask student to put VIP and pocket into and out of the carrying case.

APPLE II PLUS 48K



Manufacturer: Apple Computer, Inc.
10260 Bandley Drive
Cupertino, California 95014

Cost: $4,155.00
(July, 1980)

This includes: keyboard unit
2 floppy disk drives and controller
1 I.D.S. printer
1 13" color monitor
1 Serial Interface card
1 Table

I. Description:

The Apple II Plus is a microcomputer which accepts input through the keyboard, cassette tapes or floppy diskettes. Output is via a video monitor and/or through a printer. There is some audible output capability. There are eight card slots in the central processing unit to which peripheral equipment can be connected. There are game control paddles available. Computer use for word or symbol communication capabilities is best met with 48K of memory.

II. Size:

- Central processing unit:
    - Height: 4 inches
    - Length: 18 inches
    - Width: 15 inches
    - Weight: 3 pounds
- Disk drive:
    - Height: 3 3/4 inches
    - Length: 9 inches
    - Width: 6 inches
    - Weight: 3 pounds
- Video monitors and printers vary in size and weight.

III. Portability:

- May be carried from area to area but is too heavy, delicate and bulky to be portable
- Requires direct electrical current

IV. Interfaces:

- Available from manufacturer:

graphics pen
game paddles
graphics tablet
joy stick

- Able to adapt:

Express I optical sensor
Voice synthesizer
Autocom
Zygo 25/100 scanner using any Zygo switch through a custom built interface and program

V. Accessories:

- Available from manufacturer:

  disk drives*
  manuals
  printer*
  software

- Available from other manufacturers:

  diskettes
  video monitor
  voice synthesizer
  software
  diskette storage
  number pads
  table
  one hand encoding keyboard

VI. Display capabilities:

- 40 characters on 39 lines with scrolling for unlimited display

- Graphic and color capabilities

- Errors correctable until print or clear command given

- Line or page printing available with adaptations

VII. Output/feedback options:

- Audible:
  - signals if command error made
  - may be programmed or adapted to voice synthesizer

- Visual:
  - color or black and white on video monitor
  - adapt to printers

VIII. Location of equipment:

- Sturdy table with access to 120 volt electrical outlet

IX. Ease of operation:

- On/off switch not accessible to most users

- No automatic shut-off

- May be programmed to operate as a scanner

X. Cleaning:

- Clean with caution, spray no liquids on keyboard

*Requires additional peripheral cards

XI. Power source:

- Requires steady AC line current, 120 volts

XII. Service availability:

- Maintenance available at authorized service centers
- Repair available at authorized service centers

XIII. Durability:

- One year limited warranty on components
- Service agreements available from local authorized service centers

XIV. Instructional manuals:

- Self-teaching manuals available

XV. Comments:

- Unlimited capabilities for instructional use
- Limited capabilities for personal communicator
- Commercial keyboard guard available from Prentke Romich Company

APPLE II PLUS 48K

Step 1: Operation of machine

- Turn on video monitor.
- Insert the Microcommunicator Version C disk into disk drive 1.
- To turn on base unit, slide on/off switch in back of unit down to "on." A white light appears in the lower left hand corner of the keyboard and reads "POWER."
- If you wish a printed copy, turn on printer by sliding on/off switch in back of printer down.

Step 2: Sentence Program

- Ask student to scan the ten sentences on the video screen and select one sentence by depressing the corresponding number key.

Step 3: Call for Attention

- Demonstrate each of the three (3) attention getting modes.
- Ask student to select one mode.

Step 4: Change Program

- Ask student to depress "M" to change to "Make a Message" program.

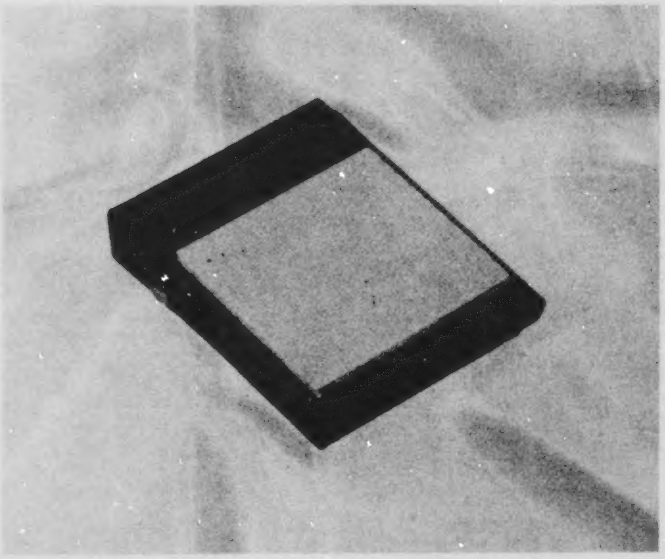
Step 5: Insert information into program. Ask student to press "7" for other choices. Ask student to press "6" to change your word. Indicate number for word change. Type your name then press "RETURN." Your name is now programmed on the disk.

Step 6: Using "Make a Message" Program

- Ask student to tell you something he likes to eat or drink.
- After message is displayed, give "print" command.
- Ask student to tell you what he likes to do.
- After message is displayed, give "print" command.

SWITCHES

NAME: Tread Switch (CM-1)



ACTIVATED BY: depressing treadle

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 3.5 mm male phone plug - cord may be completely detached from switch

MOUNTING ADAPTATIONS: ¼" 20 thread bolt may be screwed into nut on bottom of switch to mount it
2 holes to accept #4 self threading screws

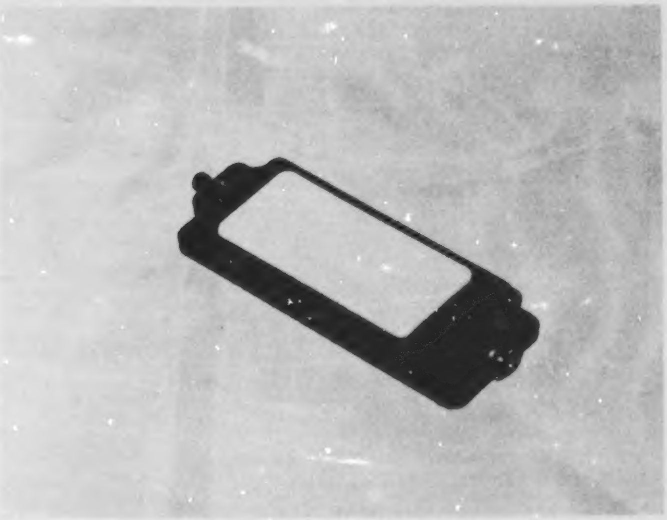
MEASUREMENTS: length: 3.5 inches, width: 1.25 inches,
height: .50 inches

PRESSURE FOR ACTIVATION: less than 5 ounces

DURABILITY: stands physical abuse

MANUFACTURER: Zygo Industries, Inc.

NAME: Touch Switch (CM 4)



ACTIVATED BY: depressing touch plate

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 3.5 mm male phone plug - cord may be completely detached from switch

MOUNTING ADAPTATIONS: 4 clearance holes for #4 screws double sided tape

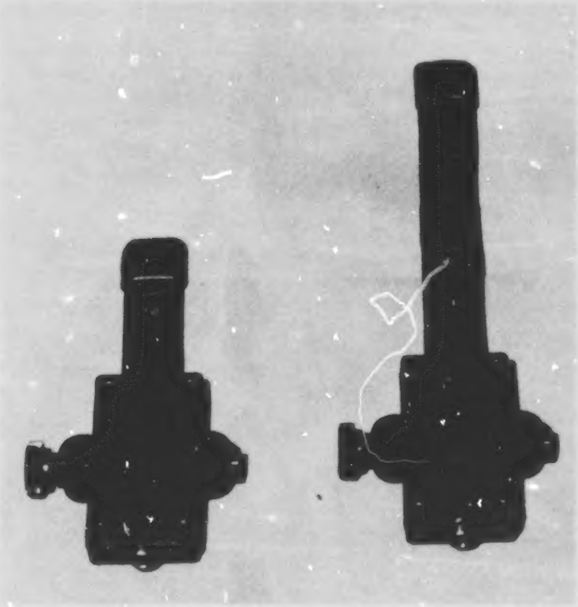
MEASUREMENTS: length: 4 inches, width: 1.25 inches,
height: .50 inches

PRESSURE FOR ACTIVATION: adjustable with screw

DURABILITY: sensitive to physical abuse and moisture

MANUFACTURER: Zygo Industries, Inc.

NAME: Leaf Switch - available with two lengths



ACTIVATED BY: deflection of leaf

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 35 mm male phone plug - cord may be completely detached

MOUNTING ADAPTATIONS: rod mount for ¼" diameter rod
screw mount #12 head screws
special - holes for #2 screw mounting on flat surface

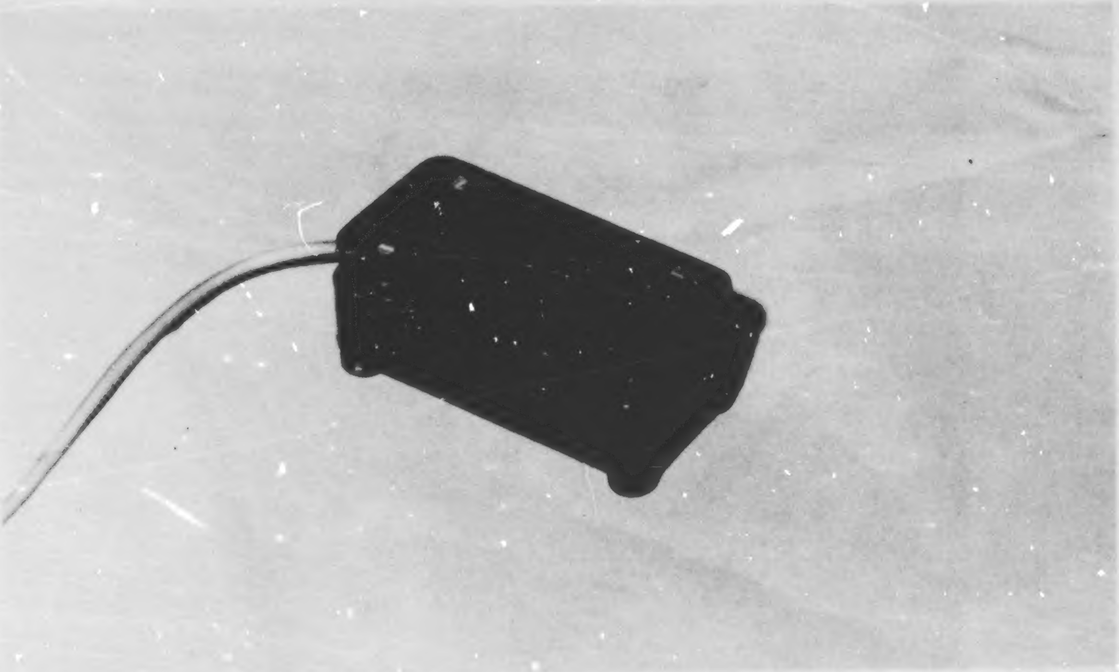
MEASUREMENTS: CM7 length: 2 inches, width: 2 inches, height: .75 inches, length leaf: 2 inches
CM2 length: 2 inches, width: 2 inches, height: .75 inches, length leaf: 4.25 inches

PRESSURE FOR ACTIVATION: minimal

DURABILITY: will not withstand physical abuse

MANUFACTURER: Zygo Industries, Inc.

NAME: Rocking Lever (R L series)



ACTIVATED BY: depressing plate - may be single or dual action

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 6 prong male cinch plug - cord is permanently attached to switch

MOUNTING ADAPTATIONS: mounting hole on bottom threaded - may be attached through corner screw holes

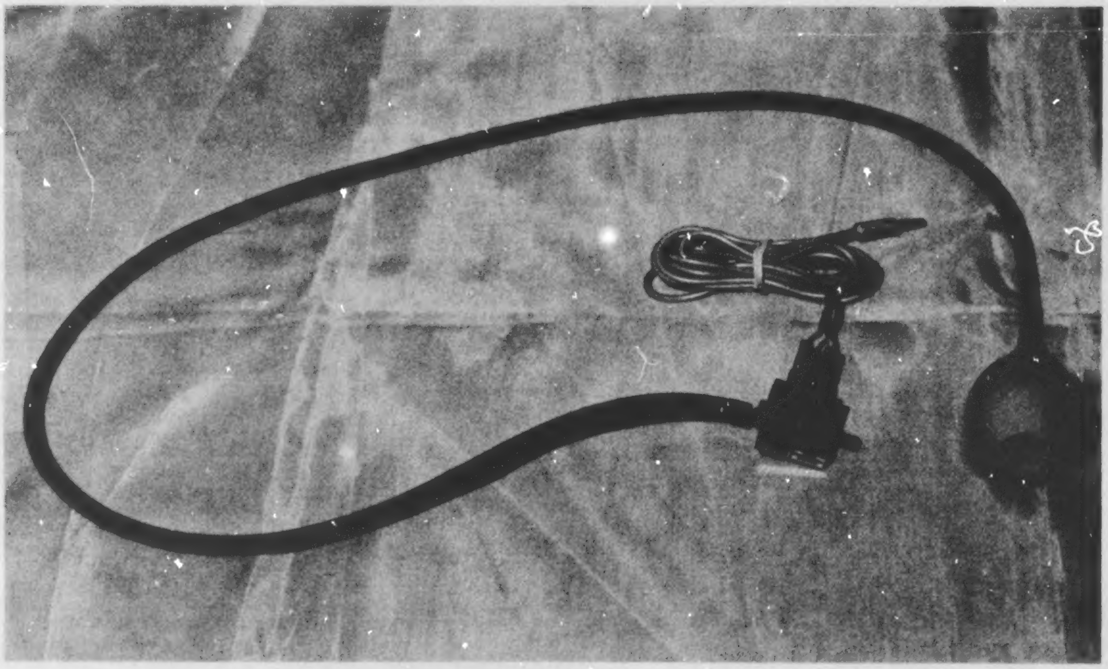
MEASUREMENTS: length: 4 inches, width: 2 inches,
height: 1.5 inches

PRESSURE FOR ACTIVATION: RL 1 & 2 require 1 ounce (30 gr.) force
RL 1M & RL 2M require more force

DURABILITY: stands some physical abuse and some moisture on external plate

MANUFACTURER: Prentke Romich Company

NAME: Pneumatic Switch



ACTIVATED BY: increasing air pressure at high port (blowing)
or decreasing pressure at low port

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 3.5 mm male phone switch - cord is
permanently attached to switch

MOUNTING ADAPTATIONS: 5/32 ID tubing
4 #2 machine screw mounting on flat plate
squeeze bulb

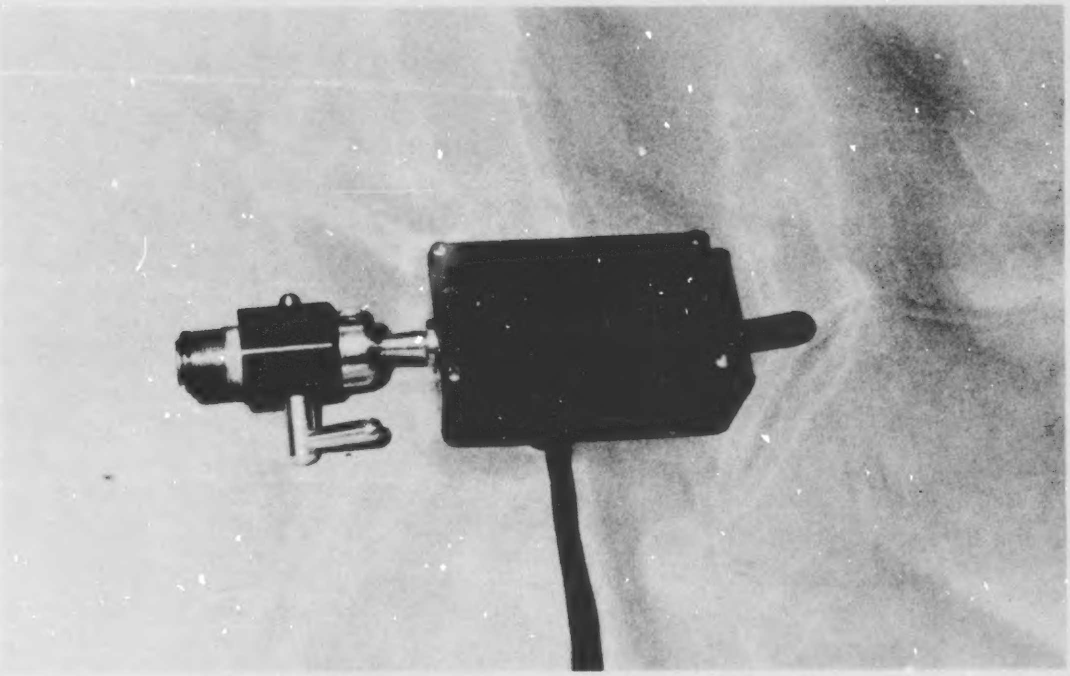
MEASUREMENTS: length: 2 inches, width: 1.25 inches,
length of tubing: 30 inches

PRESSURE FOR ACTIVATION: may be adjusted

DURABILITY: will stand some physical abuse

MANUFACTURER: Zygo Industries, Inc.

NAME: Tongue Switch (TS 2)



ACTIVATED BY: deflecting a toggle switch

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 6 prong male cinch plug - cord is permanently attached to switch

MOUNTING ADAPTATIONS: comes with 19 inch gooseneck, bracket mounting clamp and lockable ball and socket swivel

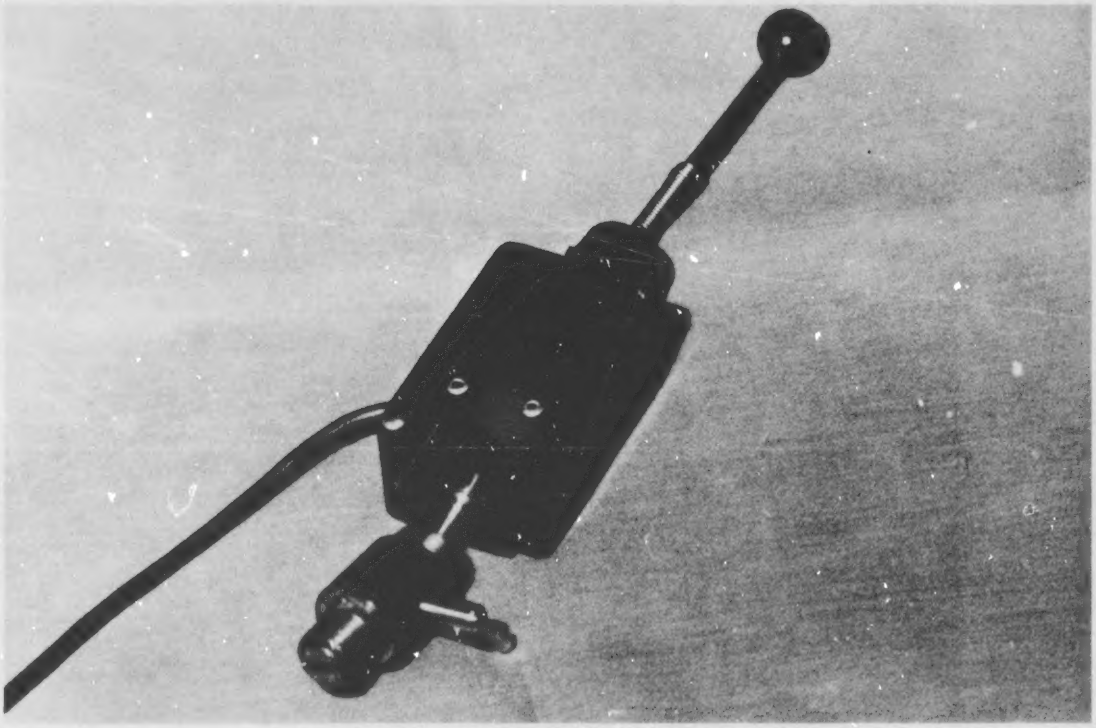
MEASUREMENTS: length: 2.75 inches, width: 2 inches,
height: 9 inches, toggle length: 1 inch

PRESSURE FOR ACTIVATION: .50 ounces (15 gr.)

DURABILITY: stands less physical abuse
not sensitive to external moisture

MANUFACTURER: Prentke Romich Company

NAME: Wobble Switch (WS 1)



ACTIVATED BY: gross movement - deflecting flexible mounted rod

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 6 prong male cinch plug - cord permanently attached to switch

MOUNTING ADAPTATIONS: comes with 19" flexible gooseneck with mounting bracket and lockable ball and socket swivel

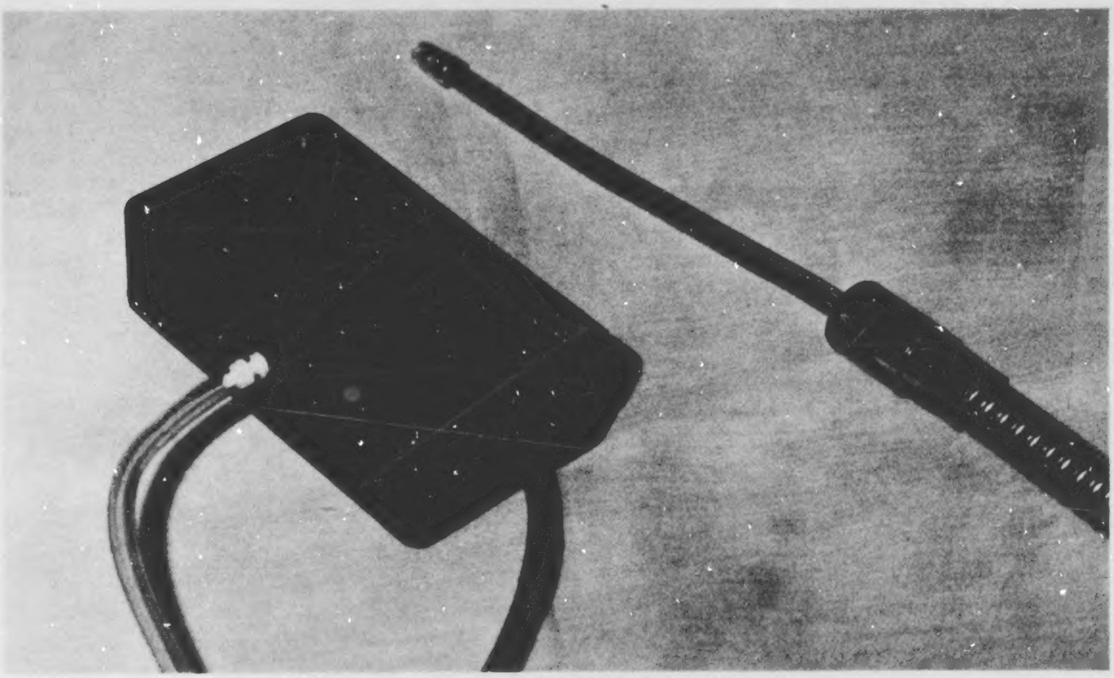
UNUSUAL FEATURES: on/off switch

MEASUREMENTS: length: 3 inches, width: 1.75 inches,
height: 1.25 inches, length rod: 4.5 inches

DURABILITY: stands physical abuse

MANUFACTURER: Prentke Romich Company

NAME: Pneumatic Switch (PS 2)



ACTIVATED BY: blowing or sucking on tube

SWITCH CONFIGURATION: normally closed

ELECTRICAL CONNECTION: 6 prong male cinch connection - cord permanently attached to switch

MOUNTING ADAPTATIONS: comes with flexible gooseneck with bracket mounting clamp

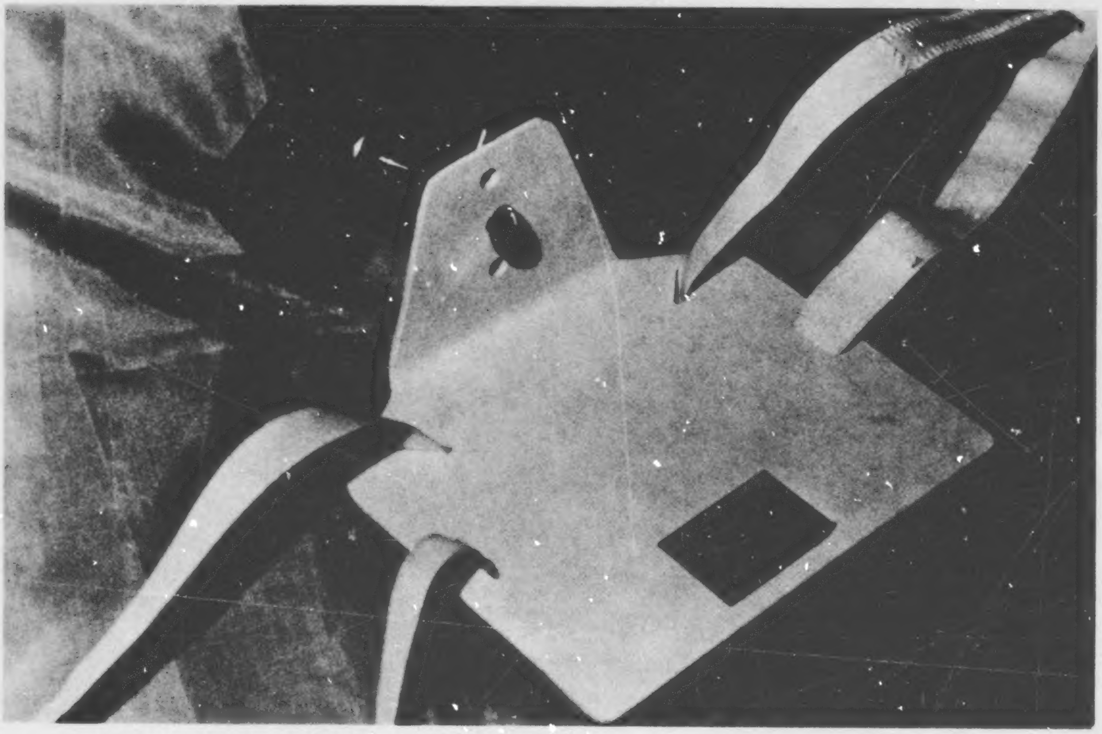
UNUSUAL FEATURES: on/off and may operate manually

MEASUREMENTS: length: 4.5 inches, width: 3 inches,
height: 2 inches, tubing variable

DURABILITY: may stand some physical abuse - not sensitive to moisture

MANUFACTURER: Prentke Romich Company

NAME: Chin Switch (CH 1 and CH 2)



ACTIVATED BY: depressing touch plate - may be single action or dual action

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 6 prong male cinch plug - cord permanently attached

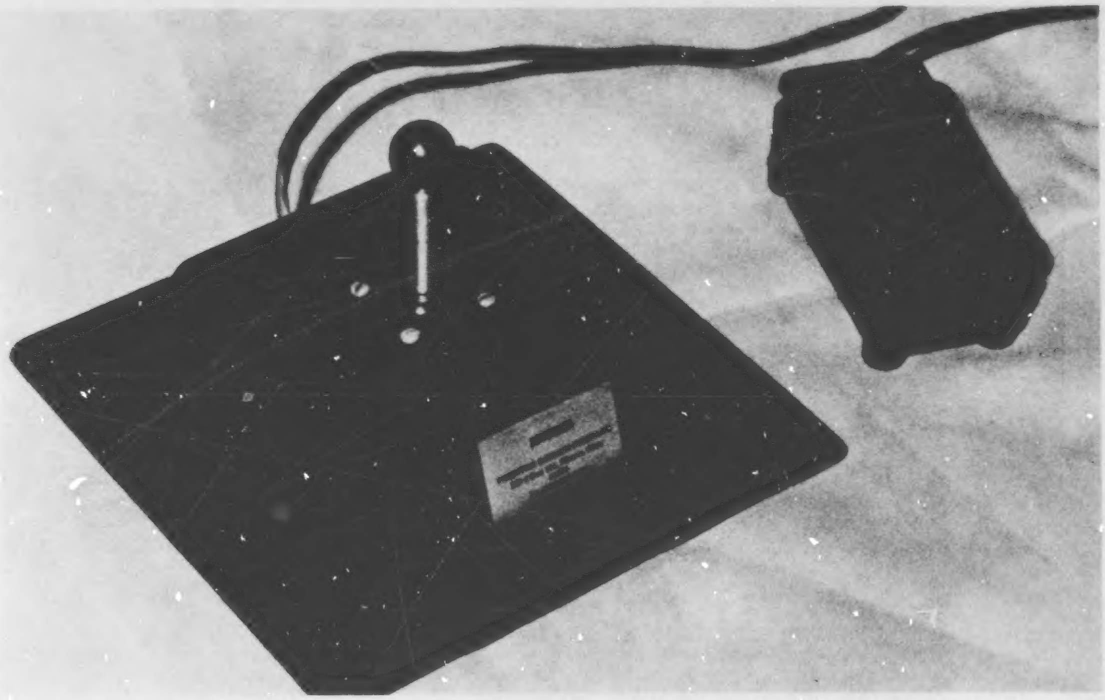
MOUNTING ADAPTATIONS: comes with 1/8" plastic chest plate with adjustable length straps, lockable ball and socket swivel

MEASUREMENTS: length: 6 inches, width: 7 inch plate,
length: 3 inches, width: 3.75 inch mounting flange
switch - length: 4 inches, width: 2 inches, height: 1.5 inches

DURABILITY: can stand some physical abuse - not sensitive to external moisture

MANUFACTURER: Prentke Romich Company

NAME: Joy Stick (JSC 4)



ACTIVATED BY: deflection of control rod

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 6 prong male cinch plug - cord permanently attached to switch

MOUNTING ADAPTATIONS: free standing

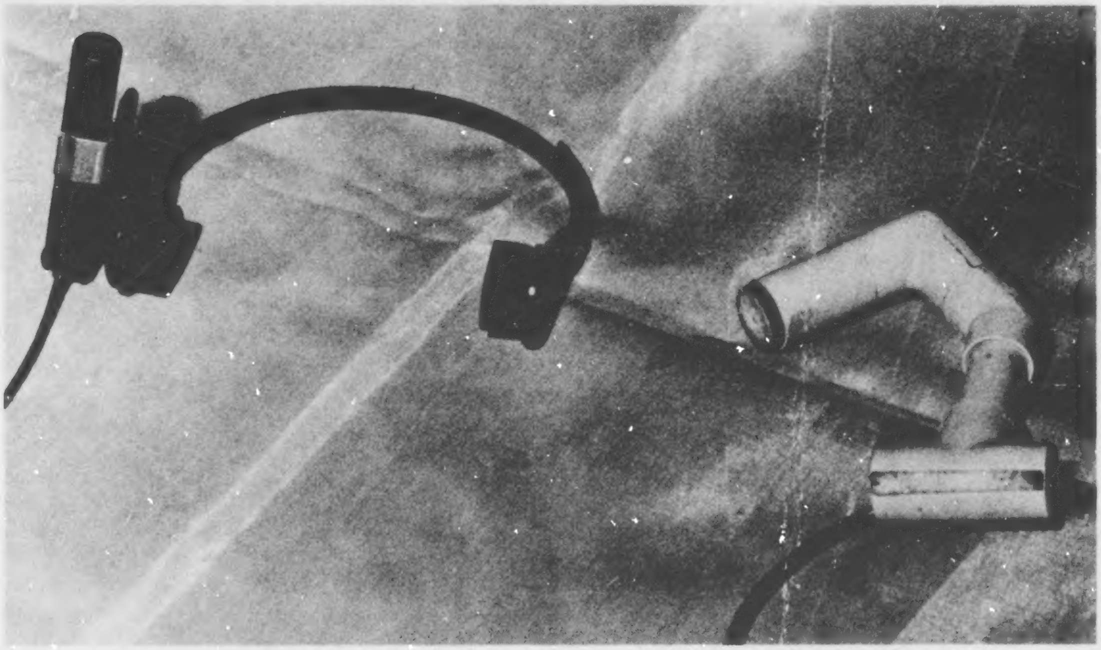
UNUSUAL FEATURES:
1) scans in 8 directions
2) requires additional switch when attached to Express I to select message

MEASUREMENTS: base - length: 7 inches, width: 7 inches, height: 2 inches, control rod: 2.5 inches, including ball

DURABILITY: can stand some physical abuse - sensitive to moisture

MANUFACTURER: Prentke Romich Company

NAME: Optical Light Sensors (OHI and Manual Printer)



ACTIVATED BY: these are not true switches, but do activate photo diodes in the Express I - the photo diodes function as "switches."

ELECTRICAL CONNECTION: is a mounted 6 prung male cinch plug - the cord is permanently attached to the light pointer

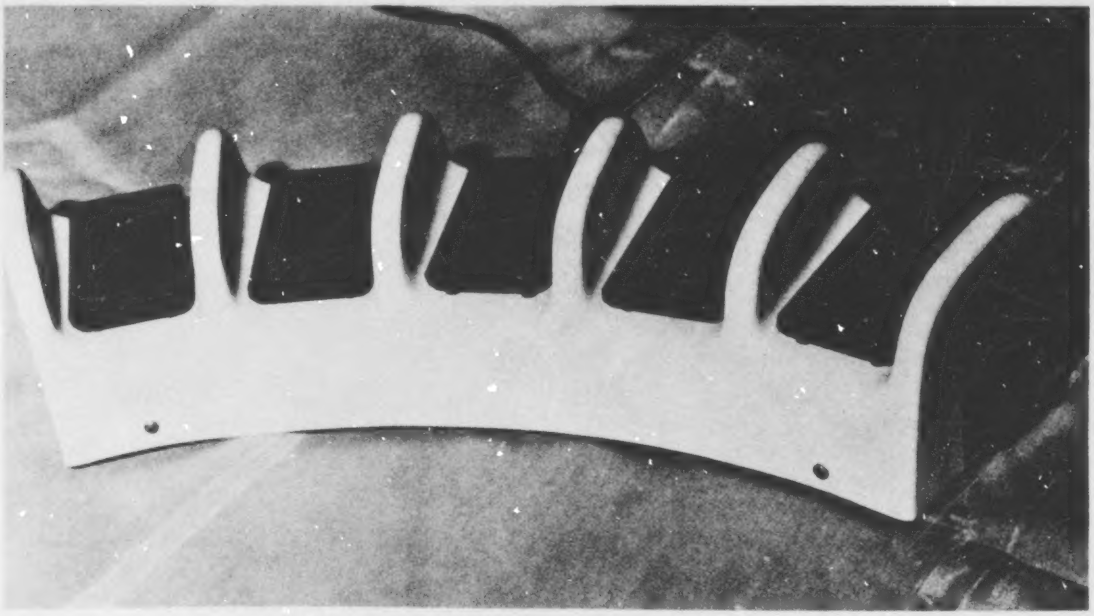
MOUNTING ADAPTATIONS: hand held manual pointer standard with Express I (may be disassembled to change configuration) - OHI comes on headband and may be mounted to eyeglasses, helmet or body part

active element of hand held pointer may be attached to a head or mouth stick

DURABILITY: will not stand physical abuse - not sensitive to moisture

MANUFACTURER: Prentke Romich Company

NAME: Arm Slot Control (ACS 4, ACS 5)



ACTIVATED BY: depressing paddle switches

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 8 prong male cinch plug - wire permanently connected

MOUNTING ADAPTATIONS: free standing - may be permanently mounted with screws in wooden base

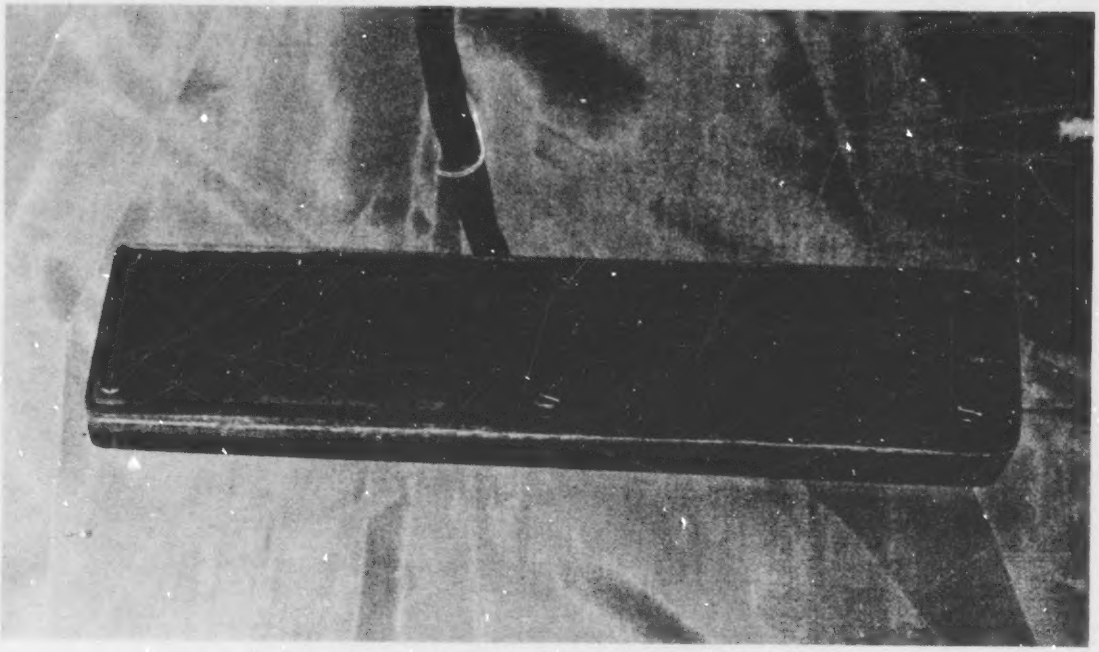
UNUSUAL FEATURES: barriers to isolate switches - ACS 5 has 4 switches to scan 4 directions and 1 switch to select

MEASUREMENTS: length: 14 inches, width: 4.5 inches,
height: 2.75 inches, height to top of barriers: 4 inches

DURABILITY: stands physical abuse - not sensitive to external moisture

MANUFACTURER: Prentke Romich Company

NAME: Multi-Directional Reed Switches (MDR 1 & MDR 2)



ACTIVATED BY: magnet

SWITCH CONFIGURATION: normally open

ELECTRICAL CONNECTION: 6 prong male cinch plug - cord permanently attached

MOUNTING ADAPTATIONS: free standing - may be recessed

UNUSUAL FEATURES: MDR 1 4 directional switches and 1 switch to select message
MDR 2 scans in 8 directions, has print position to select message

MEASUREMENTS: MDR 1 - length: 9 inches, width: 2.5 inches, height: .75 inches

DURABILITY: stands little physical abuse - not sensitive to moisture

MANUFACTURER: Robert Boysen, Orlando, Florida

DATA COMPILATION

Introduction

On the following pages are compiled the most basic sensory, motor and language requirements for the use of each communication aid that was evaluated.

It is not necessary for a student to meet all of the minimum requirements but the best match requires that a majority of the requirements be met.

While the information that follows provides guidelines for selection of equipment, the ultimate measure of appropriateness will be an equipment trial by the user.

Factors that cannot be assessed but which need to be considered include the student's motivation and the acceptance of the aid by the student and family. There is always the student who does not match the device by requisites on paper but who ultimately uses it well.

DATA COMPILATION

EQUIPMENT Speak and Spell NUMBER OF STUDENTS 25

INPUT: FINGER 19 HEADSTICK 1 OTHER 1

OPERATE KEYS 7 WITH ACCURACY 14

TURNS MACHINE ON/OFF 21

INDICATES LETTERS: CUED 11 NON-CUED 10

INDICATES ERASE: CUED 11 NON-CUED 7

SPELL SINGLE WORDS: CUED 10 NON-CUED 6

SPONTANEOUS MESSAGE: 6

COMMENTS:

- All items were cued for the deaf student.
- One student needed excessive trials for success.
- Four students were unable to operate equipment.
- Machine gives both visual and auditory feedback to user.
- The machine would make a better communicator with a space key.
- This is a good teaching tool.

DATA COMPILATION

EQUIPMENT Zygo NUMBER OF STUDENTS 25

NUMBER OF ITEMS DISPLAYED: 25 14 100 9

OVERLAY USED: PICTURE 1 SYMBOL 17 WORD 5

SWITCH USED: TREAD 21 ROCKING LEVER 1

TOUCH 2 TONGUE 1

TURN MACHINE ON/OFF 7

INPUT NO MESSAGES 2

INPUT SINGLE RESPONSES: CUED 8 NON-CUED 13

INPUT TWO RESPONSE PHRASE: CUED 7 NON-CUED 10

INPUT THREE RESPONSE PHRASE: CUED 4 NON-CUED 10

INPUT OPEN SPONTANEOUS ANSWER 12

INPUT OPEN SPONTANEOUS MESSAGE 9

INDICATE COLOR 7 INDICATE ALPHABET 8

INDICATE NUMBER 8 USE MEMORY FUNCTION 8

COMMENTS:

- One student used more than one switch.
- When students used both the 25 and 100 item displays, data from the best test was used. When using the 25 item display, a student had four chances to select a word. When the 100 item display was used, a student had only one chance to select a word. The students who were more physically involved did better using the 25 item display.
- Two students were unable to attend to both scanning lights and the switch.
- All items were cued for the deaf student.
- Four students needed excessive trials for success.
- Indicating color was very difficult because of the location of colors in the first row.
- Indicating items in the first column was difficult.

DATA COMPILATION

EQUIPMENT HandiVoice 110 NUMBER OF STUDENTS 25

OVERLAY USED: PICTURE 9 SYMBOL 11 WORD 7 NONE 3

TURN MACHINE ON/OFF 20 ADJUST VOLUME 19

DEPRESS SWITCH 21 REQUIRED USE OF WIRE GUARD 21

INPUT NO MESSAGES 4

INPUT SINGLE RESPONSES, SINGLE LEVEL CUED: SYMBOL/WORD 5 PICTURE 1
NON-CUED: SYMBOL/WORD 13 PICTURE 2

INPUT SINGLE RESPONSES, CHANGE LEVEL: CUED 4 NON-CUED 10

INPUT TWO RESPONSE PHRASE,SINGLE LEVEL: CUED 4 NON-CUED 10

INPUT TWO RESPONSE PHRASE,CHANGE LEVEL: CUED 6 NON-CUED 8

INPUT THREE-FIVE RESPONSE PHRASE, SINGLE LEVEL: CUED 2 NON-CUED 10

INPUT OPEN SPONTANEOUS MESSAGE 9

USE OF PAUSE BETWEEN SENTENCES 6 USE OF ALPHABET 6

USE OF ECHO ON/OFF 6 USE OF BEEP ON/OFF 6

USE OF PHRASE MODE/SAVE 6 USE OF MEMORY FUNCTION 6

USE OF PREFIXES AND SUFFIXES 6

COMMENTS:

- Only those students who could use the HandiVoice without overlays could progress to the items beyond spontaneous message.
- Maturity rather than academic level is the most important quality in use of the HandiVoice.
- Use of the wire guard helped students target the area and improved speed of activation.

DATA COMPILATION

EQUIPMENT Express I NUMBER OF STUDENTS 25

SWITCH USED: OPTICAL LIGHT SENSOR 2 ARM SLOT CONTROL 1

HAND HELD LIGHT SENSOR 9 TREAD SWITCH 1

PROGRAM MODE: DIRECT SELECTION 11 SCANNING 2

INPUT NO WORDS 12

INPUT SINGLE WORD: CUED 1 NON-CUED 11

INPUT TWO WORD PHRASE: CUED 2 NON-CUED 12

SPELL SELECTED SIMPLE WORDS: CUED 6 NON-CUED 5

INPUT SELECTED SENTENCE AND PUNCTUATION: CUED 2 NON-CUED 10

INPUT OPEN SPONTANEOUS ANSWER 10

INPUT OPEN SPONTANEOUS MESSAGE 10

COMMENTS:

- Six students had insufficient alphanumeric skills to use device.
- Three students with severe motoric problems were unable to use device.
- All items were cued for deaf student.
- One student used both tread switch and arm slot control.
- Device was positioned on a table with device stand for all trials.
- Independent use requires a 2.5 reading level.
- Students who had been expected to require row/column scanning modes were able to use one of the direct selection modes.
- Use of "Print Off" and "Display Off" enabled a severely handicapped user to discontinue function without turning off power.

DATA COMPILATION

EQUIPMENT Canon NUMBER OF STUDENTS 25

INPUT: FINGER 18 HEADSTICK 2 TOE 1

TURNS MACHINE ON/OFF 9 USE OF GUARDS 8

OPERATE KEYS 7 WITH ACCURACY 12

INDICATE LETTERS: CUED 12 NON-CUED 8

SPELL SINGLE WORDS: CUED 11 NON-CUED 8

SPELL TWO WORD PHRASES: CUED 8 NON-CUED 7

ABLE TO CORRECT ERROR 7

OPERATE SHIFT KEY 7

SELECTED SENTENCES AND PUNCTUATION 6

OPEN SPONTANEOUS MESSAGE 7

COMMENTS:

- Five students with severe motoric problems were unable to use device.
- Independent use requires fourth grade or better spelling skills for functional use as a communicator.
- Tearing off printed strip is difficult. The best students were unable to do it well.
- One student who spells at grade 2 level looks at a Blissymbol board and copies the printed word from it. The student is able to create spontaneous messages in this manner.
- The deaf student was cued on each trial.

DATA COMPILATION

EQUIPMENT VIP NUMBER OF STUDENTS 25

INPUT: FINGER 18 HEADSTICK 1 OTHER 1

OPERATE KEYS 12 WITH ACCURACY 7

TURNS MACHINE ON/OFF 8

INDICATE LETTERS: CUED 12 NON-CUED 6

SPELL SINGLE WORDS: CUED 9 NON-CUED 6

SPELL TWO WORD PHRASES: CUED 3 NON-CUED 6

ABLE TO CORRECT ERROR 7 OPERATE "FIGURE" KEY 7

OPERATE "CLEAR" KEY 7 OPERATE "REPEAT" KEY 6

SELECTED SENTENCES AND PUNCTUATION 5

OPEN SPONTANEOUS MESSAGE 5

ATTACHES TALKING POCKET TO MACHINE 1

OPERATE SPACE KEY 3

COMMENTS:

- Six students with severe motoric problems were unable to use the device.
- Twelve of nineteen students required many trials for success.
- The deaf student was cued on each trial.
- The device was usually placed on dycem to aid in stability on a flat surface.
- The location of the letter/character above or below the keys should be in different colors to aid the students in knowing which key to depress.
- Independent use requires fourth grade or better spelling skills.

DATA COMPILATION

EQUIPMENT Apple II NUMBER OF STUDENTS 25

INPUT: FINGER 7 HEADSTICK 3 MOUTHSTICK 1

APPLE UNIT POSITIONED ON INCLINE BOARD 8

OPERATE KEYS 8 WITH ACCURACY 6

TURNS MACHINE ON/OFF 4

ALL TRIALS USED MICROCOMMUNICATOR PROGRAM VERSION C

SELECTED ONE ITEM FROM LIST OF 10 USING NUMBER KEYS 9

KEYED "M" UPON REQUEST 9 SPELL SINGLE WORD 6

INPUT OPEN SPONTANEOUS ANSWER 6

INPUT PRINT COMMAND REQUIRING THREE COMMANDS 6

INPUT OPEN SPONTANEOUS MESSAGE 7

COMMENTS:

- Six students had insufficient alphanumeric skills to use program.
- Four students with severe motoric problems were unable to use device.
- Two students could input data but had many errors due to motoric problems.
- Several students were able to be more accurate on the top and bottom rows of the keyboard. Selections from the middle two rows were less accurate.
- Two students used two input systems.
- Independent use requires a third grade reading level.

MINIMUM CRITERIA FOR USE

This section identifies criteria which is applicable to all devices tested and general considerations for all devices. This is followed by specific criteria in the sensory, motor and language areas for each device related to two functions, as a communication aid or as an instructional aid. The minimum user criteria profile attempts to compare the characteristics needed by the student to be an effective aid for communication and instructional use. The scale of 0 - 4 shows relative amounts of the characteristic with 0 being high. This provides a graphic picture of the strengths and limitations of each device as both a communication aid and an instructional aid.

The profiles of minimum use for all devices tested in the center indicate that:

1. Visual attending and tracking skills must be well-developed if a device is to be used as a communication aid. These skills may be improved while using the devices as instructional aids.
2. Auditory skills make no difference in use of a device as a communication aid, with the exception of the HandiVoice.
3. Tactile defensiveness becomes important when a communication activator is attached to the user's body, i.e. optical sensor.
4. Motor planning was the most important perceptual factor in the use of a device as a communication aid. The Apple II is the only device that requires good perceptual skills in all areas for use as a communication aid.
5. Locomotion was not a factor in the use of any device.
6. Motor involvement and methods of accessing become more important as the size of the target area on a device decreases, i.e. small keys.
7. Range of motion was only a determining factor when using the HandiVoice or the Express activated by the arm slot or hand held pointer.
8. Alphanumeric skills limit a device for communication purposes. Many devices can be adapted by instructors to expand this use for prereading or nonreading users.

General Considerations

Selectively these devices may be appropriate as personal communicators if a majority of the minimum criteria identified in this manual are met.

The information presented here should not be considered conclusive. Time constraints, available equipment and a small population limited the amount of information which could be gathered.

This information will be updated yearly as data is gathered from use of new commercial equipment, custom adaptations to present equipment and a changing student population.

An additional area that needs to be investigated is the speed of user input. Communication is a dialogue in which the speed of a participant's reponse is crucial. The CSEC will endeavor to gather initial information in this area.

MINIMUM CRITERIA FOR USE

EQUIPMENT: Speak and Spell USE: Communication aid

SENSORY CRITERIA

-Visual	
Acuity:	corrected not within normal limits (WNL)
Attention:	good
Tracking:	moderate difficulty in 2 planes
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	fair
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age

MOTOR CRITERIA

-Degree of Involvement:	moderate
-Reflexes that Interfere:	moderate
-Tone:	normal to high
-Range of Motion:	severe
-Method of Accessing:	finger or toe
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	4.0 spelling level
-Response Length:	one word
-Spontaneity:	solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Speak and Spell USE: Instructional

SENSORY CRITERIA

- Visual
  - Acuity: corrected not WNL
  - Attention: poor
  - Tracking: moderate difficulty in 2+ planes
- Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- Tactile Defensiveness: present
- Perceptual
  - Motor Planning: poor
  - Figure Ground: below maturational level
  - Visual Discrimination: below maturational level

MOTOR CRITERIA

- Degree of Involvement: moderate
- Reflexes that Interfere: moderate
- Tone: normal to high
- Range of Motion: severe
- Method of Accessing: finger or toe
- Locomotion: unable to propel

LANGUAGE CRITERIA

- Display Language: less than 2.0 spelling level
- Response Length: one word
- Spontaneity: solicited response

TABLE 3 -- MINIMUM CRITERIA USER PROFILE FOR SPEAK AND SPELL

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	********************** ++++++++
		Tracking	*************** ++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	********************** +++++++++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	*************** +++++++++++++++
		Reflexes that Interfere	*************** +++++++++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	******** ++++++++
		Method of Accessing	*************** +++++++++++++++
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	***************************** +++++++++++++++
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Zygo 25 Display USE: Communication aid

SENSORY CRITERIA

- -Visual
  - Acuity: corrected not WNL
  - Attention: fair
  - Tracking: moderate difficulty in 1 plane
- -Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- -Tactile Defensiveness present
- -Perceptual
  - Motor Planning: fair
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- -Degree of Involvement: severe
- -Reflexes that Interfere: severe
- -Tone: normal to high
- -Range of Motion: severe
- -Method of Accessing: finger, toe, fist or head
- -Locomotion: unable to propel

LANGUAGE CRITERIA

- -Display Language: pictures
- -Response Length: one word
- -Spontaneity: solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Zygo 25 Display USE: Instructional

SENSORY CRITERIA

- Visual
  - Acuity: corrected not WNL
  - Attention: poor
  - Tracking: moderate difficulty in 2 planes
- Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- Tactile Defensiveness present
- Perceptual
  - Motor Planning: poor
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- Degree of Involvement: severe
- Reflexes that Interfere: severe
- Tone: normal to high
- Range of Motion: severe
- Method of Accessing: finger, toe, fist or head
- Locomotion: unable to propel

LANGUAGE CRITERIA

- Display Language: pictures
- Response Length: one word
- Spontaneity: solicited response

TABLE 4 -- MINIMUM CRITERIA USER PROFILE FOR ZYGO 25 DISPLAY

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

Characteristic of User			4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	*************** ++++++++
		Tracking	********************** +++++++++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	*************** ++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	******** ++++++++
		Reflexes that Interfere	******** ++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	******** ++++++++
		Method of Accessing	* +
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	* +
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Zygo 100 Display USE: Communication aid

SENSORY CRITERIA	
-Visual	
Acuity:	corrected not WNL
Attention:	good
Tracking:	within normal limits
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	good
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age
MOTOR CRITERIA	
-Degree of Involvement:	moderate
-Reflexes that Interfere:	moderate
-Tone:	normal to high
-Range of Motion:	severe
-Method of Accessing:	finger, toe, fist or head
-Locomotion:	unable to propel
LANGUAGE CRITERIA	
-Display Language:	symbols
-Response Length:	one word
-Spontaneity:	solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Zygo 100 Display USE: Instructional

SENSORY CRITERIA

- -Visual
  - Acuity: corrected not WNL
  - Attention: fair
  - Tracking: moderate difficulty in 1 plane
- -Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- -Tactile Defensiveness present
- -Perceptual
  - Motor Planning: fair
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- -Degree of Involvement: severe
- -Reflexes that Interfere: severe
- -Tone: normal to high
- -Range of Motion: severe
- -Method of Accessing: finger, toe, fist or head
- -Locomotion: unable to propel

LANGUAGE CRITERIA

- -Display Language: symbols
- -Response Length: one word
- -Spontaneity: solicited response

TABLE 5 -- MINIMUM CRITERIA USER PROFILE FOR ZYGO 100 DISPLAY

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	********************** +++++++++++++++
		Tracking	***************************** ++++++++++++++++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	********************** +++++++++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	*************** ++++++++
		Reflexes that Interfere	*************** ++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	******** ++++++++
		Method of Accessing	* +
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	******** ++++++++
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Handivoice 110 USE: Communication aid
(Single Item Overlay)

SENSORY CRITERIA

- Visual
  - Acuity: corrected not WNL
  - Attention: good
  - Tracking: moderate difficulty in 2 planes
- Auditory
  - Acuity: corrected WNL
  - Attention: good
  - Discrimination: good
- Tactile Defensiveness present
- Perceptual
  - Motor Planning: fair
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- Degree of Involvement: moderate
- Reflexes that Interfere: moderate
- Tone: normal, fluctuating, high
- Range of Motion: moderate
- Method of Accessing: finger, toe or head
- Locomotion: unable to propel

LANGUAGE CRITERIA

- Display Language: pictures
- Response Length: one word
- Spontaneity: solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Handivoice 110 (Single Item Display)   USE: Instructional

SENSORY CRITERIA

-Visual	
Acuity:	corrected not WNL
Attention:	fair
Tracking:	moderate difficulty in 2 planes
-Auditory	
Acuity:	hearing impaired
Attention:	fair
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	poor
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age

MOTOR CRITERIA

-Degree of Involvement:	severe
-Reflexes that Interfere:	severe
-Tone:	normal, fluctuating, high
-Range of Motion:	severe
-Method of Accessing:	finger , toe or head
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	pictures
-Response Length:	one word
-Spontaneity:	solicited response

TABLE 6 -- MINIMUM CRITERIA USER PROFILE FOR HANDIVOICE 110--Single Item Overlay

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4	3	2	1	0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++				
		Attention	********************** +++++++++++++++				
		Tracking	*************** ++++++++				
	AUDITORY	Acuity	********************** +++++++++++++++				
		Attention	********************** +++++++++++++++				
		Discrimination	********************** ++++++++				
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++				
		Motor Planning	********************** +++++++++++++++				
		Figure Ground	********************** ++++++++++++++++++++++				
		Visual Discrimination	********************** ++++++++++++++++++++++				
	MOTOR	Degree of Involvement	*************** ++++++++				
		Reflexes that Interfere	*************** ++++++++				
		Muscle Tone	******** ++++++++				
		Range of Motion	*************** ++++++++				
		Method of Accessing	* +				
		Locomotion	******** ++++++++				
	LANGUAGE	Display Language	* +				
		Response Length	*************** +++++++++++++++				
		Spontaneity	*************** +++++++++++++++				

MINIMUM CRITERIA FOR USE

EQUIPMENT: Handivoice 110 (Four Level Display)   USE: Communication aid

SENSORY CRITERIA

-Visual	
Acuity:	corrected WNL
Attention:	excellent
Tracking:	moderate difficulty in 1 plane
-Auditory	
Acuity:	corrected WNL
Attention:	good
Discrimination:	good
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	good
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age

MOTOR CRITERIA

-Degree of Involvement:	moderate
-Reflexes that Interfere:	moderate
-Tone:	normal, fluctuating, high
-Range of Motion:	moderate
-Method of Accessing:	finger, toe or head
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	3.0 reading level
-Response Length:	one word
-Spontaneity:	solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Handivoice 110 (Four Level Display)   USE: Instructional

SENSORY CRITERIA

-Visual	
Acuity:	corrected WNL
Attention:	good
Tracking:	moderate difficulty in 1 plane
-Auditory	
Acuity:	hearing impaired
Attention:	fair
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	fair
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age

MOTOR CRITERIA

-Degree of Involvement:	severe
-Reflexes that Interfere:	severe
-Tone:	normal, fluctuating, high
-Range of Motion:	severe
-Method of Accessing:	finger, toe or head
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	words
-Response Length:	one word
-Spontaneity:	solicited response

TABLE 7 -- MINIMUM CRITERIA USER PROFILE FOR HANDIVOICE 110--FOUR LEVEL DISPLAY

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4 3 2 1 0
SENSORY	VISUAL	Acuity	********************** ++++++++++++++++++++++
		Attention	***************************** ++++++++++++++++++++++
		Tracking	********************** +++++++++++++++
	AUDITORY	Acuity	********************** +++++++++++++++
		Attention	********************** +++++++++++++++
		Discrimination	********************** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	***************************** ++++++++++++++++++++++
		Figure Ground	***************************** ++++++++++++++++++++++
		Visual Discrimination	***************************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	*************** ++++++++
		Reflexes that Interfere	*************** ++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	*************** ++++++++
		Method of Accessing	* +
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	********************** +++++++++++++++
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Hand Held) USE: Communication aid

SENSORY CRITERIA

- -Visual
  - Acuity: corrected not WNL
  - Attention: good
  - Tracking: moderate difficulty in 2 planes
- -Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- -Tactile Defensiveness present
- -Perceptual
  - Motor Planning: fair
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- -Degree of Involvement: mild
- -Reflexes that Interfere: mild
- -Tone: normal to high
- -Range of Motion: mild
- -Method of Accessing: isolated finger or fist
- -Locomotion: unable to propel

LANGUAGE CRITERIA

- -Display Language: symbols
- -Response Length: one word
- -Spontaneity: solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Hand Held) USE: Instructional

SENSORY CRITERIA

- Visual
  - Acuity: corrected not WNL
  - Attention: fair
  - Tracking: moderate difficulty in 2+ planes
- Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- Tactile Defensiveness present
- Perceptual
  - Motor Planning: poor
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- Degree of Involvement: moderate
- Reflexes that Interfere: moderate
- Tone: normal to high
- Range of Motion: moderate
- Method of Accessing: isolated finger or fist
- Locomotion: unable to propel

LANGUAGE CRITERIA

- Display Language: pictures
- Response Length: one word
- Spontaneity: solicited response

TABLE 8 -- MINIMUM CRITERIA USER PROFILE FOR EXPRESS I--HAND HELD SENSOR

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	********************** +++++++++++++++
		Tracking	*************** ++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	********************** +++++++++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	********************** +++++++++++++++
		Reflexes that Interfere	********************** +++++++++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	********************** +++++++++++++++
		Method of Accessing	******** ++++++++
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	******** +
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Optical Sensor) USE: Communication aid

SENSORY CRITERIA	
-Visual	
Acuity:	corrected not WNL
Attention:	good
Tracking:	moderate difficulty in 2 planes
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	absent
-Perceptual	
Motor Planning:	good
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age
MOTOR CRITERIA	
-Degree of Involvement:	severe
-Reflexes that Interfere:	severe
-Tone:	low to high
-Range of Motion:	severe
-Method of Accessing:	head
-Locomotion:	unable to propel
LANGUAGE CRITERIA	
-Display Language:	symbols
-Response Length:	one word
-Spontaneity:	solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Optical Sensor) USE: Instructional

SENSORY CRITERIA

-Visual	
Acuity:	corrected not WNL
Attention:	fair
Tracking:	moderate difficulty in 2+ planes
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	poor
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age

MOTOR CRITERIA

-Degree of Involvement:	severe
-Reflexes that Interfere:	severe
-Tone:	low to high
-Range of Motion:	severe
-Method of Accessing:	head
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	pictures
-Response Length:	one word
-Spontaneity:	solicited response

TABLE 9 -- MINIMUM CRITERIA USER PROFILE FOR EXPRESS I--OPTICAL SENSOR

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	********************** +++++++++++++++
		Tracking	*************** ++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	***************************** ++++++++++++++++++++++
		Motor Planning	***************************** +++++++++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	******** ++++++++
		Reflexes that Interfere	******** ++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	******** ++++++++
		Method of Accessing	* +
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	******** +
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Arm Slot Control) USE: Communication aid

SENSORY CRITERIA

- -Visual
  - Acuity: corrected not WNL
  - Attention: good
  - Tracking: moderate difficulty in 2 planes
- -Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- -Tactile Defensiveness present
- -Perceptual
  - Motor Planning: fair
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- -Degree of Involvement: severe
- -Reflexes that Interfere: severe
- -Tone: fluctuating or high
- -Range of Motion: moderate
- -Method of Accessing: finger, foot or fist
- -Locomotion: unable to propel

LANGUAGE CRITERIA

- -Display Language: symbols
- -Response Length: one word
- -Spontaneity: solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Arm Slot Control) USE: Instructional

SENSORY CRITERIA

-Visual	
Acuity:	corrected not WNL
Attention:	fair
Tracking:	moderate difficulty in 2+ plans
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	poor
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age

MOTOR CRITERIA

-Degree of Involvement:	severe
-Reflexes that Interfere:	severe
-Tone:	fluctuating or high
-Range of Motion:	moderate
-Method of Accessing:	finger, foot or fist
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	pictures
-Response Length:	one word
-Spontaneity:	solicited response

TABLE 10 -- MINIMUM CRITERIA USER PROFILE FOR EXPRESS I--ARM SLOT CONTROL

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

Characteristic of User			4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	********************** +++++++++++++++
		Tracking	*************** ++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	********************** +++++++++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	******** ++++++++
		Reflexes that Interfere	******** ++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	*************** +++++++++++++++
		Method of Accessing	******** ++++++++
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	******** +
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Other) USE: Communication aid

SENSORY CRITERIA

-Visual

Acuity: corrected not WNL

Attention: good

Tracking: moderate difficulty in 2 planes

-Auditory

Acuity: totally deaf

Attention: poor

Discrimination: poor

-Tactile Defensiveness present

-Perceptual

Motor Planning: fair

Figure Ground: below maturational age

Visual Discrimination: below maturational age

MOTOR CRITERIA

-Degree of Involvement: moderate

-Reflexes that Interfere: moderate

-Tone: low, fluctuating, high

-Range of Motion: severe

-Method of Accessing: isolated finger, foot or fist

-Locomotion: unable to propel

LANGUAGE CRITERIA

-Display Language: symbols

-Response Length: one word

-Spontaneity: solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Express I (Other) USE: Instructional

SENSORY CRITERIA

- Visual
  - Acuity: corrected not WNL
  - Attention: fair
  - Tracking: moderate difficulty in 2+ planes
- Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- Tactile Defensiveness present
- Perceptual
  - Motor Planning: poor
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- Degree of Involvement: moderate
- Reflexes that Interfere: moderate
- Tone: low to high
- Range of Motion: severe
- Method of Accessing: isolated finger, foot or fist
- Locomotion: unable to propel

LANGUAGE CRITERIA

- Display Language: pictures
- Response Length: one word
- Spontaneity: solicited response

TABLE 11 -- MINIMUM CRITERIA USER PROFILE FOR EXPRESS I--OTHER CONTROLS

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4	3	2	1	0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++				
		Attention	********************** +++++++++++++++				
		Tracking	*************** ++++++++				
	AUDITORY	Acuity	******** ++++++++				
		Attention	******** ++++++++				
		Discrimination	******** ++++++++				
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++				
		Motor Planning	********************** +++++++++++++++				
		Figure Ground	********************** ++++++++++++++++++++++				
		Visual Discrimination	********************** ++++++++++++++++++++++				
	MOTOR	Degree of Involvement	*************** +++++++++++++++				
		Reflexes that Interfere	*************** +++++++++++++++				
		Muscle Tone	******** ++++++++				
		Range of Motion	******** ++++++++				
		Method of Accessing	******** ++++++++				
		Locomotion	******** ++++++++				
	LANGUAGE	Display Language	******** +				
		Response Length	*************** +++++++++++++++				
		Spontaneity	*************** +++++++++++++++				

MINIMUM CRITERIA FOR USE

EQUIPMENT: Canon Communicator USE: Communication aid

SENSORY CRITERIA

- Visual
  - Acuity: corrected not WNL
  - Attention: good
  - Tracking: moderate difficulty in 2 planes
- Auditory
  - Acuity: totally deaf
  - Attention: poor
  - Discrimination: poor
- Tactile Defensiveness present
- Perceptual
  - Motor Planning: fair
  - Figure Ground: below maturational age
  - Visual Discrimination: below maturational age

MOTOR CRITERIA

- Degree of Involvement: moderate
- Reflexes that Interfere: moderate
- Tone: normal, fluctuating, high
- Range of Motion: severe
- Method of Accessing: finger, toe or head
- Locomotion: unable to propel

LANGUAGE CRITERIA

- Display Language: spell at 4.0 grade level
- Response Length: one word
- Spontaneity: solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Canon Communicator USE: Instructional

SENSORY CRITERIA

-Visual
Acuity: corrected not WNL
Attention: fair
Tracking: moderate difficulty in 2 planes
-Auditory
Acuity: totally deaf
Attention: poor
Discrimination: poor
-Tactile Defensiveness present
-Perceptual
Motor Planning: poor
Figure Ground: below maturational age
Visual Discrimination: below maturational age

MOTOR CRITERIA

-Degree of Involvement: moderate
-Reflexes that Interfere: moderate
-Tone: normal to high
-Range of Motion: severe
-Method of Accessing: finger, toe or head
-Locomotion: unable to propel

LANGUAGE CRITERIA

-Display Language: less than 2.0 reading level
-Response Length: one word
-Spontaneity: solicited response

TABLE 12 -- MINIMUM CRITERIA USER PROFILE FOR CANON COMMUNICATOR

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

Characteristic of User			4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	********************** +++++++++++++++
		Tracking	*************** +++++++++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	********************** ++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	*************** +++++++++++++++
		Reflexes that Interfere	*************** +++++++++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	******** ++++++++
		Method of Accessing	* +
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	***************************** +++++++++++++++
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: VIP

USE: Communication aid

SENSORY CRITERIA	
-Visual	
Acuity:	corrected not WNL
Attention:	good
Tracking:	moderate difficulty in 1 plane
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	fair
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age
MOTOR CRITERIA	
-Degree of Involvement:	mild
-Reflexes that Interfere:	mild
-Tone:	normal, fluctuating, high
-Range of Motion:	severe
-Method of Accessing:	finger or toe
-Locomotion:	unable to propel
LANGUAGE CRITERIA	
-Display Language:	4.0 spelling level
-Response Length:	one word
-Spontaneity:	solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: VIP USE: Instructional

SENSORY CRITERIA

-Visual	
Acuity:	corrected not WNL
Attention:	fair
Tracking:	moderate difficulty in 2 planes
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	fair
Figure Ground:	below maturational age
Visual Discrimination:	below maturational age

MOTOR CRITERIA

-Degree of Involvement:	mild
-Reflexes that Interfere:	mild
-Tone:	normal, fluctuating, high
-Range of Motion:	severe
-Method of Accessing:	finger or toe
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	uses words less than 2.0 reading level
-Response Length:	one word
-Spontaneity:	solicited response

TABLE 13 -- MINIMUM CRITERIA USER PROFILE FOR VIP

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	********************** +++++++++++++++
		Tracking	********************** +++++++++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	********************** ++++++++++++++++++++++
		Figure Ground	********************** ++++++++++++++++++++++
		Visual Discrimination	********************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	********************** ++++++++++++++++++++++
		Reflexes that Interfere	********************** ++++++++++++++++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	******** ++++++++
		Method of Accessing	*************** +++++++++++++++
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	***************************** +++++++++++++++
		Response Length	*************** +++++++++++++++
		Spontaneity	*************** +++++++++++++++

MINIMUM CRITERIA FOR USE

EQUIPMENT: Apple II USE: Communication aid

SENSORY CRITERIA

-Visual	
Acuity:	corrected not WNL
Attention:	excellent
Tracking:	within normal limits
-Auditory	
Acuity:	totally deaf
Attention:	poor
Discrimination:	poor
-Tactile Defensiveness	present
-Perceptual	
Motor Planning:	good
Figure Ground:	within normal limits
Visual Discrimination:	within mormal limits

MOTOR CRITERIA

-Degree of Involvement:	moderate
-Reflexes that Interfere:	moderate
-Tone:	normal, fluctuating, high
-Range of Motion:	moderate to severe
-Method of Accessing:	finger , toe or head
-Locomotion:	unable to propel

LANGUAGE CRITERIA

-Display Language:	4.0 spelling level
-Response Length:	one word
-Spontaneity:	solicited response

MINIMUM CRITERIA FOR USE

EQUIPMENT: Apple II USE: Instructional

SENSORY CRITERIA

-Visual
Acuity: corrected not WNL
Attention: good
Tracking: moderate difficulty in 1 plane
-Auditory
Acuity: totally deaf
Attention: poor
Discrimination: poor
-Tactile Defensiveness present
-Perceptual
Motor Planning: poor
Figure Ground: below maturational age
Visual Discrimination: below maturational age

MOTOR CRITERIA

-Degree of Involvement: moderate
-Reflexes that Interfere: moderate
-Tone: normal, fluctuating, high
-Range of Motion: moderate to severe
-Method of Accessing: finger , toe or head
-Locomotion: unable to propel

LANGUAGE CRITERIA

-Display Language: pictures
-Response Length: single letter
-Spontaneity: solicited response

TABLE 14 -- MINIMUM CRITERIA USER PROFILE FOR APPLE II

Showing amount of each characteristic needed to effectively use the aid for communication (***) and for instruction (+++) with 0 being high or near normal.

	Characteristic of User		4 3 2 1 0
SENSORY	VISUAL	Acuity	*************** +++++++++++++++
		Attention	***************************** ++++++++++++++++++++++
		Tracking	***************************** ++++++++++++++++++++++
	AUDITORY	Acuity	******** ++++++++
		Attention	******** ++++++++
		Discrimination	******** ++++++++
	PERCEPTUAL	Tactile Defensiveness	********************** ++++++++++++++++++++++
		Motor Planning	***************************** +++++++++++++++
		Figure Ground	***************************** ++++++++++++++++++++++
		Visual Discrimination	***************************** ++++++++++++++++++++++
	MOTOR	Degree of Involvement	*************** +++++++++++++++
		Reflexes that Interfere	*************** +++++++++++++++
		Muscle Tone	******** ++++++++
		Range of Motion	******** ++++++++
		Method of Accessing	* +
		Locomotion	******** ++++++++
	LANGUAGE	Display Language	***************************** +
		Response Length	*************** ++++++++
		Spontaneity	*************** +++++++++++++++

APPENDICES

COMMUNICATION SYSTEMS EVALUATION CENTER

Student Input Evaluation

Student's Name________________________________Date:__________Time:____________

Input Interface:________________________Output Interface:________________________

Adaptions/Accessories:____

Position of Student:____

Position of Equipment:____

Position of Interface:____

Program Used:________________________Student Method of Input:__________________

MACHINE	always	often	occasionally	seldom	never	comment:
1. Turn on/off						
2. Adjust volume						
KEYBOARD						
1. Press keys accurately						
2. Exert enough pressure on keys						
ACCESSORIES						

Comments:

CSEC 7/80

one on one	individual	command	response	speed of input	speed of output	comments

POSITIONING

Seating and positioning needs for most of the students were evaluated before language, equipment usage and communication. Even some of the mildly involved students required some positioning modifications. The recommendations for all students varied from simple, inexpensive classroom suggestions to a complex control seating system.

The basic concerns for proper positioning were two-fold. The first concern was to provide sufficient body stability to allow the student to spend most of his energy on learning and less on maintaining body alignment while in his chair. Secondly, provision of correct positioning allowed the student to more successfully reach, manipulate or utilize communication and equipment systems.

As a corollary to the second concern, many students required several alternative positions in the classroom and at home or both. The alternatives were provided to give the student a respite from his chair, a change of viewpoint and opportunities to rest in good positions.

The value of correct positioning cannot be overemphasized. It is the key to successful communication.

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GLOSSARY

Anoxia--a condition in which oxygen is not available to the blood, i.e. drowning, suffocation, cardiac arrest.

Cerebral Palsy--this term includes a wide range of disabilities resulting from maldevelopment or damage in the brain at or before birth or in earliest childhood. Cerebral palsy is nonprogressive, and may involve motor, sensory and perception areas of the brain. Abnormal muscle tone is present. The vast majority of people with cerebral palsy have different combinations of areas of involvement.

Ataxic--the student's tone is relatively normal but coordination is poorly controlled. The student lacks stability and fine motor coordination.

Athetoid--the student's tone is not steady and fluctuates from low to high. The student lacks postural stability and shows involuntary motions. The student usually has few contractures.

Spastic--the student's muscle tone is generally high. Although it may be lower at times, it is rarely less than normal. Student has difficulty moving because muscles on all sides of joints contract simultaneously. The student often has severe contractures.

Cerebral Vascular Accident (C.V.A.)--acute damage to the brain from rupture blockage or spasm of blood vessels. Damage is dependent on extent and location of the damage, but certain areas seem more vulnerable than others. Speech centers are often involved. This may occur at any age.

Diplegia--a student having abnormal postural tone in the entire body, but the lower extremities are more involved than the upper extremities. The student is usually spastic or mixed. The student may have eye involvement.

Hemi or Hemiplegic--a student having abnormal postural tone in one side of the body. The student is usually spastic, rarely mixed. There may be some involvement of speech and eye coordination.

I.D.--the inside diameter of a pipe or tube.

Light Emitting Diode (L.E.D.)--an electronic component which lights up similarly to a light bulb, but does not have a true filament. Commonly seen in calculators with red or blue lighted numbers, for example.

Liquid Crystal Diode (L.C.D.)--lights by polarization of light in a liquid crystal. Commonly seen in new digital watches.

Meningitis--a general term referring to inflammation of the three coverings of the brain or spinal cord. It may be bacterial or viral. Waste products of the inflammation cause varying degrees of damage to the central nervous system.

N C Switch--a normally closed switch which allows current to flow until the switch is activated.

N O Switch--a normally open switch which does not allow current to flow until the switch is activated.

Para or Paraplegic--a student having significant neuromuscular involvement in the lower extremities and portions of the trunk. Paraplegia is an extremely rare occurence. Most cerebral palsy paras are actually diplegics with little significant involvement in the upper extremities.

Quad or Quadriplegic--a student having abnormal postural tone in the entire body, but the upper parts more than the lower. Often are asymetrically involved, have poor head control and show involvement of speech and eye coordination.

Range of Motion--the arc of motion that occurs when a joint or joints are moved passively or actively from one position to the opposite position, i.e. from fully bent knee to fully straight knee.

Switch--a mechanical or electronic method of controlling the flow of electricity.

Tone--the degree of tension present in all muscles in everyone's body. The degree may be low, normal, high or it may fluctuate from low to normal. Fluctuations may occur with changes of position, the student's attitude, ambient temperature, fatigue and other factors.

TTY--teletype.

Within Normal Limits (WNL)--according to generally accepted methods of measuring a particular parameter.

BEES
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FLORIDA DEPARTMENT OF EDUCATION
DIVISION OF PUBLIC SCHOOLS
BUREAU OF EDUCATION FOR EXCEPTIONAL STUDENTS

Florida Department of Education Publications in Exceptional Student Education

The following is a list of publications developed by the Bureau of Education for Exceptional Students to assist local school systems in the provision of special programs for exceptional students. For additional information, please contact:

Mrs. Linda D. Schroeder, Consultant
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Bureau of Education for Exceptional Students
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RESOURCE MANUALS

Laws and Rules

___ Volume I-B: Florida Statutes and State Board of Education Rules: Excerpts for Programs for Exceptional Students, 1982.
___ Volume I-C: Federal Laws and Regulations Pertaining to the Education of Exceptional Students - P.L. 94-142, Sec. 504, and P.L. 89-313, 1982.
___ Volume I-E: Florida Statutes and State Board of Education Rules: Florida School for the Deaf and the Blind - Florida Department of Health and Rehabilitative Services, 1980.

Program Manuals

___ Volume II-A: Visually Impaired
___ Volume II-B: Mentally Handicapped, 1982.
___ Volume II-C: Speech and Language Impaired, 1979.
___ Volume II-D: Hearing Impaired: Deaf and Hard of Hearing
___ Volume II-E: Emotionally Handicapped, 1981.
___ Volume II-F: Specific Learning Disabilities, 1980.
___ Volume II-G: Gifted, 1980.
___ Volume II-H: Homebound/Hospitalized, 1980.
___ Volume II-I: Physically Impaired, 1977.
___ Volume II-J: Occupational and Physical Therapy, 1982.
___ Volume II-K: Deaf-Blind, 1982.

Topical Manuals

___ Volume III-A: Individual Educational Programs, 1980.
___ Volume III-B: Evaluating the Non-English Speaking Handicapped, 1982.
___ Volume III-C: Mediation and Due Process Procedures, 1982.
___ Volume III-D: Maintaining Education Records of Pupils and Adult Students, 1982.
___ Volume III-E: Alternative Communication Systems for Non-Vocal Students, 1982.
___ Volume III-F: Electronic Communication Devices for Visually Impaired Students, 1982.
___ Volume III-G: Alternative Delivery Systems for Homebound/Hospitalized Students, 1982.
___ Volume III-H: Supplement User's Guide AAMD ABS-PSV, 1981.
___ Volume III-I: Computer Assisted Instruction and Support for the Handicapped: Interim Report, 1982.

Training Manuals

___ Volume IV-A: Training Manual for School Bus Drivers Transporting the Handicapped, 1982.
___ Volume IV-B: A Training Manual for Teachers of the Homebound/Hospitalized Student, 1980.

Curriculum Planning Resources

___ Volume V-A: Curriculum Planning Resource Manual for Developmental Skills and Communication Skills; Hearing Impaired: Deaf and Hard of Hearing, 1977.
___ Volume V-B: MODELL: Music or Drama to Enhance Language Learning, 1982.

State of Florida
Department of Education
Tallahassee, Florida
Ralph D. Turlington, Commissioner
Affirmative action/equal
opportunity employer

This reprint of a public document was promulgated at an annual cost of $1,847.50 or $3.70 per copy to assist local school districts in developing appropriate programs for non-vocal students.

FLORIDA: A STATE OF EDUCATIONAL DISTINCTION. "On a statewide average, educational achievement in the State of Florida will equal that of the upper quartile of states within five years, as indicated by commonly accepted criteria of attainment." Adopted, State Board of Education, Jan. 20, 1981